DOCUMENT RESUME

ED 107 948 95 CE 004 161

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TITLE An Analysis of the Auto Body Repair Occupation.
INSTITUTION Ohio State Dept. of Education, Columbus. Div. of Vocational Education.; Ohio State Univ., Columbus. Trade and Industrial Education Instructional Materials Lab.
SPONS AGENCY Office of Education (DHEW), Washington, D.C.
PUB DATE 75
NOTE 210p.; For related documents, see CE 004 160, CE 004 162-206, CE 004 263-268 and CE 004 425-427

EDRS PRICE MF-$0.76 HC-$10.78 PLUS POSTAGE
DESCRIPTORS *Auto Body Repairmen; *Auto Mechanics (Occupation); Communication Skills; *Job Analysis; Knowledge Level; Mechanical Skills; Mechanics (Process); *Occupational Information; Safety; Skill Analysis; Skill Development; Skilled Occupations; *Task Analysis; Task Performance; Work Attitudes

ABSTRACT

The general purpose of the occupational analysis is to provide workable, basic information dealing with the many and varied duties performed in the auto body mechanic occupation. The document opens with a brief introduction followed by a job description. The bulk of the document is presented in table form. Eleven duties are broken down into a number of tasks and for each task a two-page table is presented, showing on the first page; tools, equipment, materials, objects acted upon; performance knowledge (related also to decisions, cues and errors); safety--hazard; and on the second page: science; math--number systems; and communications (performance modes, examples, and skills and concepts). The duties include: managing a body shop; refinishing; repairing and patching damages; repairing and maintaining cooling systems; repairing frame damage and front suspension and steering; removing and replacing panels; repairing and replacing fiberglass panels; maintaining electrical system and interior trim; and adjusting doors, deck lids, hoods, bumpers, and door glass. (BP)

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Occupational Analysis

CE 004161

ED107948

AUTO BODY MECHANIC

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Instructional Materials Laboratory
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5169

AN ANALYSIS OF THE AUTO BODY REPAIR OCCUPATION

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Occupational Analysis
E.P.D.A. Sub Project 73402
June 1, 1973 to December 30, 1974
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"The activity which is the subject of this report was supported in whole or in part by the U.S. Office of Education, Department of Health, Education, and Welfare. However, the opinions expressed herein do not reflect the position or policy of the U.S. Office of Education, and no official endorsement by the U.S. Office of Education should be inferred."

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FOREWORD

The occupational analysis project was conducted by The Instructional Materials Laboratory, Trade and Industrial Education, The Ohio State University in conjunction with the State Department of Education, Division of Vocational Education pursuant to a grant from the U.S. Office of Education.

The Occupational Analysis project was proposed and conducted to train vocational educators in the techniques of making a comprehensive occupational analysis. Instructors were selected from Agriculture, Business, Distributive, Home Economics and Trade and Industrial Education to gain experience in developing analysis documents for sixty-one different occupations. Representatives from Business, Industry, Medicine, and Education were involved with the vocational instructors in conducting the analysis process.

The project was conducted in three phases. Phase one involved the planning and development of the project strategies. The analysis process was based on sound principles of learning and behavior. Phase two was the identification, selection and orientation of all participants. The training and workshop sessions constituted the third phase. Two-week workshops were held during which teams of vocational instructors conducted an analysis of the occupations in which they had employment experience. The instructors were assisted by both occupational consultants and subject matter specialists.

The project resulted in producing one hundred two trained vocational instructors capable of conducting and assisting in a comprehensive analysis of various occupations. Occupational analysis data were generated for sixty-one occupations. The analysis included a statement of the various tasks performed in each occupation. For each task the following items were identified: tools and equipment; procedural knowledge; safety knowledge; concepts and skills of mathematics, science and communication needed for successful performance in the occupation. The analysis data provided a basis for generating instructional materials, course outlines, student performance objectives, criterion measures as well as identifying specific supporting skills and knowledge in the academic subject areas.

PREFACE

An attempt has bee. ade in this book to present some of the major duties and the related tasks peculiar to t auto body repair trade. Some of these major duties cover management, sheet metal repair, s t metal replacement, frame work and other. It is not a complete coverage of the auto b y trade. Many duties such as vinyl top installation, convertible top repair and radiator repair along with custom work has relagated to specialty shops but are still major duties. The writers have also shown a correlation of physical science, mathematics, behavioral science, safety and communication with the actual trade performance.

ACKNOWLEDGMENT

We wish to acknowledge the valuable assistance rendered by the following subject matter specialists. They provided input to the vocational instructors in identifying related skills and concepts of each respective subject matter area and served as training assistants in the analysis process during the two-week workshops.

Rollin M. Barber, Psychology
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Acknowledgment is extended to the following I.M.L. staff members for their role in conducting the workshops; editing, revising, proofing and typing the analyses.

Faith Justice	Research Associate
Sheila Nelson	Administrative Assistant
Marsha Opritza	Editorial Consultant
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JOB DESCRIPTION

The auto body trade is a highly skilled profession. The auto body mechanic must have knowledge and skill related to several other trades. To be successful the worker must take great pride in his/her work, be physically strong, have good eye sight and patience.

The duties of the auto body mechanic may include making estimates, ordering parts and materials, keeping records, figuring bills and payroll. Refinishing knowledge and skill are necessary to keep up with the changing automotive finishes and new products including primers, sealers, alkyd enamel, acrylic enamel, acrylic lacquer, polyurethane, spot refinishing and metallic color matching.

The worker must be able to repair all types of damage including patching rust, straightening bent panel, replacing damaged panels on both steel and fiber glass bodied automobiles. He/she should have knowledge of the cooling system and air-conditioning; be able to check pressure and conduct tests as well as replace all parts damaged in a collision. Repairing the front suspension and steering is performed in many bodyshops as well as diagnosing and repairing frame damage. A knowledge of and the ability to trouble shoot and repair the electrical system is also essential to mastery of the trade.

Other duties usually done in body shops are replacing glass, interior trim and all types of adjusting and aligning of parts. Some shops may require washing, waxing and interior cleaning.

The duties performed by a mechanic can range from doing only one general duty, such as refinishing, to being able to perform all these tasks mentioned.

Duty A Managing and Operating a Body Shop

1 Write estimates
2 File estimates alphabetically
3 Verify insurance coverage
4 Order parts and material
5 Schedule work
6 Write repair orders and record parts and materials
7 Record costs, payments and deposits
8 Keeping payroll records
9 Order and maintain tools and equipment
10 Establish safety regulations
11 Handle customer complaints

(TASK STATEMENT) WRITE ESTIMATES

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Estimate sheets Collision manual Adding machine Clip board Flat rate books Body and frame illustration book	Physically inspect damages Visually inspect damages Record damage in correct sequence Make required number of copies Price out parts and material Price out labor operations Obtain a correct total	Car must be repairable to meet safety standards Broken glass-cuts Ragged metal edges-cuts
DECISIONS	**CUES**	**ERRORS**
Whether to repair or replace	Cost of parts Availability of part Total cost of repairs	Incorrect prices Incorrect labor Missing items Hidden damage

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A_1 **(TASK STATEMENT)** WRITE ESTIMATES

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Relationship of force to distortion in an elastic body [direct and indirect damage] Resistance of materials to change in shape [bends, twists, and stretches] Behavioral Science (see index)	Deduction Fundamental operations (calculation) Addition, subtraction, multiplication, division algorithms Order of operations, i.e., use of parentheses in simplifying arithmetic expressions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Writing	Estimate	Penmanship, spelling, classification description, terminology/ general vocabulary, usage
Speaking	To the customer	Terminology/general vocabulary, appropriate diction, enunciation clarity of expression, facial and body features, usage

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(TASK STATEMENT) FILE ESTIMATES ALPHABETICALLY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
File cabinet File folders Index tabs	File customers last name File daily Keep file current Maintain a dead file	N/A

DECISIONS	CUES	ERRORS
Length of time to keep estimate current	Usually a claim is handled within 7 days Competitive estimates Customer preference	Loss of estimates

A_2 **(TASK STATEMENT)** FILE ESTIMATES ALPHABETICALLY

SCIENCE	MATH – NUMBER SYSTEMS
Behavioral Science (see index)	Use of Numbers (without calculation) [deduction length of time] Coding

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Files	Detail/inference, terminology

A_3 (TASK STATEMENT) VERIFY INSURANCE COVERAGE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARDS
Telephone Mail service Insurance check Insurance proof of loss **Adjustor's authorization** Insurance releases	Obtain: Customers name and address Make and year of car Name of insurance company Name of insurance agent Policy number if possible Type of insurance **Adjustor's phone number**	N/A

DECISIONS	CUES	ERRORS
What type of coverage is involved Whether or not to start repairs	Proof of loss Written authorization Check Insurance releases	Non-payment Law suits Poor relations with insurance company

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A_3 (TASK STATEMENT) VERIFY INSURANCE COVERAGE

SCIENCE	MATH – NUMBER SYSTEMS
Behavioral Science (see index)	Use of numbers (without calculation) [recording numbers] recording

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Questioning customer Questioning insurance company	Terminology/general vocabulary, appropriate diction, enunciation clarity of expression, usage
Seeing	Make and year of vehicle	Visual analysis, memory, describing, detail and inference, color discrimination, recognition of symbols, codes, emblems
Writing	Record information	Penmanship, spelling, classification description, reports, terminology/general vocabulary, usage

A_4 (TASK STATEMENT) ORDER PARTS AND MATERIALS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Telephone Mail service Estimates Sales persons Parts department	Determine material Select sources of supply Secure repair order or estimate Determine current price lists Determine quantity	N/A

DECISIONS	CUES	ERRORS
Where to buy How much to buy Availability	Price difference Speed of delivery	Wrong material Incorrect parts Excessive car tie-up time Dissatisfied owner

A4(TASK STATEMENT) ORDER PARTS AND MATERIALS

SCIENCE	MATH – NUMBER SYSTEMS
Behavioral Science (see index)	Deduction Use of numbers (without calculation) Coding

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Telephone	Terminology/general vocabulary, appropriate diction, enunciation clarity of expression
Reading	Estimates Repair orders Price lists	Detail/inference, information reports recommendation reports, description of mechanisms, terminology

A_5 (TASK STATEMENT) SCHEDULE WORK

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Appointment book Route sheets Telephone Drive in customers	Determine worker capabilities Determine availibility of parts and materials Keep work flowing smoothly Write all appointments	N/A

DECISIONS	CUES	ERRORS
When to bring the vehicle in When the vehicle will be finished	Availibility of parts Time involved in performing work Amount of work in shop Amount of work scheduled	Worker absenteeism Wrong parts Insufficent part Insufficent time Human error in scheduling

A5 (TASK STATEMENT) SCHEDULE WORK

SCIENCE	MATH – NUMBER SYSTEMS
Behavioral Science (see index)	Use of numbers(without calculation) [recording] Coding

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Parts houses Parts departments	Terminology/general vocabulary
Writing	Appointments	Penmanship, spelling, memo format, terminology/general vocabulary

A6 (TASK STATEMENT) WRITE REPAIR ORDERS AND RECORD PARTS AND MATERIALS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Repair order forms Carbon paper Repair order rack (alaphabetize) Adding machine Tax tables Flat rate book Material price lists Parts price lists	Have repair orders signed Write name, address, and telephone Write make, year model and license Write date when promised Write date order written List all labor operations Attach copy of estimate List all part and materials Price all charges Obtain correct total	N/A

DECISIONS	CUES	ERRORS
N/A	N/A	Unsigned order Incorrect totals Missed items Incomplete information

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A6 (TASK STATEMENT) WRITE REPAIR ORDERS AND RECORD PARTS AND MATERIAL

SCIENCE	MATH – NUMBER SYSTEMS
Behavioral Science (see index)	Basic knowledge of math Addition Subtraction Division Multiplication Percentages Use of numbers (without calculation) Coding Recording

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Writing	Repair orders	Penmanship, spelling, classification description, terminology/general vocabulary

(TASK STATEMENT) RECORD COSTS, PAYMENTS, AND DEPOSITS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Repair order copies Parts invoices Material invoices Towing invoices Sublet labor invoices Bookkeeping ledger Adding machine Tool equipment invoices File cabinet and folders Utility and building expenses Bank book Check book Insurance	Open a checking account Obtain a bookkeeping ledger File all bills and invoices File copies of repair orders Record of all checks issued Obtain correct bank balances Record all monies received Record all accounts receivable Record all credit receipts Obtain correct totals	N/A

DECISIONS	CUES	ERRORS
What type of bookkeeping system to use Whether or not to have a bookkeeper	Size of business Cost of a bookkeeper	Inaccurate listing of material Incorrect material prices Out-dated flat rate books Failure to pay invoices

(TASK STATEMENT) RECORD COSTS, PAYMENTS, AND DEPOSITS

SCIENCE	MATH – NUMBER SYSTEMS
Behavioral Science (see index)	Rationals Fundamental operations (calculation) Addition, subtraction, multiplication, division algorithms Order of operations, i.e., use of parentheses in simplifying arithmetic expressions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking Reading	Conversing Bank tellers Accountant Bookkeeper Tabulation	Terminology/general vocabulary Detail/inference, speed/rate [numbers]

A_8 (TASK STATEMENT) KEEP PAYROLL RECORDS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Payroll book Flat rate time slips Time cards Employees with holding statements Workmans compensation table Social security table Federial income tax table State and local income tax tables	Figure wages Make deductions Issue checks Keep careful records Issue checks to all tax agencies	N/A

DECISIONS	CUES	ERRORS
Type of system to use	One that meets the needs	Pay all taxes on time to avoid penalities Not keeping accurate records

A_8 (TASK STATEMENT) KEEP PAYROLL RECORDS

SCIENCE	MATH – NUMBER SYSTEMS
Behavioral Science (see index)	Whole numbers - decimals Fundamental operations (calculation) Addition, subtraction, multiplication, and division algorithms Order of operations, i.e., use of parentheses in simplifying arithmetic expressions

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COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Writing	Payroll book	Penmanship Classification

A_9 (TASK STATEMENT) ORDER AND MAINTAIN TOOLS AND EQUIPMENT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Catalogs and service manuals Sales person Standard tool kit Oil and greases	Institute a maintenance program Keep maintenance records Consult owners of same equipment Compare prices on like equipment Determine method of payment Keep equipment parts list on file	Shut down air compressor while servicing and draining - catch in moving parts Disconnect all electrical equipment when servicing - shock Wear eye protection - eye injury Loose clothing and long hair - catch in moving parts Meet O.S.H.A. standards
DECISIONS	**CUES**	**ERRORS**
Determine the need for new equipment Determine whether to repair or replace equipment	Price Frequency of use Foreign material in oil	Buying inferior equipment Buying unnecessary equipment Not buying equipment when needed

A9 (TASK STATEMENT) ORDER AND MAINTAIN TOOLS AND EQUIPMENT

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Simple machines used to gain mechanical advantage [standard tool kit] Effects of friction on work precesses and product quality [foreign material in oil] Behavioral Science (see index)	Use of numbers (without calculation) [recording] Coding

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Equipment company	Terminology/general vocabulary, appropriate diction, enunciation, clarity of expression
Writing	Record keeping	Penmanship, spelling, classification, description

A_{10} (TASK STATEMENT) ESTABLISH SAFETY REGULATIONS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Signs Fire extinguishers First aid kit Automatic sprinkler system Special storage area for inflammable equipment Safety cans Exhaust fan Spray booth Oil absorbing material Building to meet safety code Approved spray respirators	Post ''No Smoking'' signs Post safety bulletins Keep fire extinguishers full Keep inflammables in proper place Dirty rags in safety cans Change filters in spray booth Make sure all tools are grounded properly Maintain a clean shop Observe O.S.H.A. regulations Keep first aid kit complete	Follow standard safety rules
DECISIONS	**CUES**	**ERRORS**
N/A	N/A	N/A

A_{10} (TASK STATEMENT) ESTABLISH SAFETY REGULATIONS

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Fluids under pressure (Incompressibility, transfer of pressure) Behavioral Science (see index)	N/A

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Shop foreman Safety director	Terminology/general vocabulary, appropriate diction, implying, enunciation, clarity of expression persuasion and sales technique, denotative/connotative words, gestures, facial and body features usage

A_{11} (TASK STATEMENT) HANDLE CUSTOMER COMPLAINTS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Customer lounge Private office Repair order or estimate	Listen to complaint Look at the complaint Validate complaint Discuss complaint Arrive at a decision Make arrangement to satisfy customer complaints	N/A

DECISIONS	CUES	ERRORS
Determine if the customers complaint is valid	Unsatisfactory work Work not performed	Loss of profit Loss of customer

A11 (TASK STATEMENT) HANDLE CUSTOMER COMPLAINTS

SCIENCE	MATH – NUMBER SYSTEMS
Behavioral Science (see index).	N/A

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Customer Worker	Terminology/general vocabulary, appropriate diction, implying, enunciation, clarity of expression, persuasion and sales technique, poise, gestures, usage
Seeing	Examining the work Checking estimate Checking repair order	Visual analysis, describing, color discrimination

Duty B Refinishing

1 Wash and dewax vehicle
2 Remove decorative features
3 Ascertain type of original finish and type to be used
4 Inspect old surface for defects
5 Featheredging broken surfaces
6 Mixing and reducing refinishing material
7 Treat bare metal
8 Masking operations
9 Apply primer surfacer and glazing putty
10 Sand old finish, primer surfacer and glazing putty
11 Preparation for alkyd enamel refinishing
12 Refinishing with acrylic enamel
13 Preparation for polyurethane
14 Preparation for acrylic lacquer refinishing
15 Spot refinishing and touch up
16 Polish (rubbing) lacquer finishes
17 Apply striping and decals
18 Clean up and prepare for delivery

B_1 (TASK STATEMENT) WASH AND DEWAX VEHICLE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Hose and water Bucket and sponge Car wash soap Chemical dewaxer Toweling Clean rags	Mix soap and water in bucket Wash car Dry car Apply dewaxer Wipe dry, clean cloths	Eye protection - eye injury Dewaxers are flammable - fire Proper ventilation - fire, breathing Dewaxers will burn skin

DECISIONS	CUES	ERRORS
Determine type of dewaxer to use	Amount of road film Amount of road tar Amount of tree sap	Damage to painted surface

B_1 (TASK STATEMENT) WASH AND DEWAX VEHICLE

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Effects of friction on work processes and product quality [rubbing with sponge and dewaxer to remove foreign matter] Behavioral Science (see index)	Use of numbers (without calculation) [ratio-soap to water] Coding

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Directions on containers	Information reports, recommendation reports, description of mechanism
Speaking	Questioning shop foreman and peer group	Terminology/general vocabulary, clarity of expression

B_2 **(TASK STATEMENT)** REMOVE DECORATIVE FEATURES WHERE NECESSARY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Steel wool Rubbing compounds	Remove interior trim if necessary Select correct tool Carefully remove item **and store retainers and fasteners** **Clean items for reinstallation** Store items in safe place	Sharp metal - cuts Eye protection - eye injury Tool slippage - injury to hands

DECISIONS	CUES	ERRORS
Determine which items to remove Determine how items are to be removed **Decide where to store items**	Items cover rust Items difficult to mask Excessive labor involved	Broken items Inferior finish around items Lost items

(TASK STATEMENT) REMOVE DECORATIVE FEATURES WHERE NECESSARY

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Simple machines used to gain mechanical advantages (examples: levers, gears, pulleys) [standard tool kit] Effect of friction on work processes and product quality [steel wool works on a friction principle, and rubbing compounds friction principle] Behavioral Science (see index)	N/A

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COMMUNICATIONS		
PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Question shop foreman	Terminology/general vocabulary, clarity of expression

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B_3 **(TASK STATEMENT)** ASCERTAIN TYPE OF ORIGINAL FINISH AND TYPE TO BE USED

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Lacquer thinner Clean rags	Dampen rag with thinner Rub spot on vehicle Check rag for paint **Analyze rag, decide what type of finish is on the vehicle and what type to use**	Thinners are flammable - fire Use exhaust fans - breathing Store thinner rags in proper containers - fire

DECISIONS	CUES	ERRORS
Determine which type of finish to use	Type of finish on the vehicle Material on the rag	Paint lifting Poor adhesion Failure to match original appearance

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B_3 **(TASK STATEMENT)** ASCERTAIN TYPE OF ORIGINAL FINISH AND TYPE TO BE USED

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Chemical solubility of old base or finish Behavioral Science (see index)	Deduction

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COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Refinishing manual	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, terminology
Speaking	Shop foreman Peer group **Salesperson**	Terminology/general vocabulary, clarity of expression

40

B_4 **(TASK STATEMENT)** INSPECT OLD SURFACE FOR DEFECTS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Vehicle	Inspect surface for cracking Inspect surface for crazing Inspect surface for checking Inspect surface for lifting Inspect surface for rust, chips, excessive film thickness Inspect for adhesion loss	N/A

DECISIONS	CUES	ERRORS
Determine type of preparation to use	Type of defects present	Failure of the new finish

B_4 (TASK STATEMENT) INSPECT OLD SURFACE FOR DEFECTS

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Effect of heating and cooling on expansion of materials [cooling and heating effect on paint surface] Behavioral Science (see index)	N/A

A2

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	Visual inspection	Visual analysis, describing, logic, detail/inference, color discrimination

A2

(TASK STATEMENT) FEATHEREDGE BROKEN SURFACES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Bucket and sponge Sanding block or powder sander Sanding disks or sandpaper	Bevel into the adjacent area with coarse sand paper, wet or dry and sanding block or power sander Beveled edge is again sanded with finer grit sand paper wet or dry and sanding block or power sander	Eye protection needed-eye injury Safety standard rules for all power equipment and compressed air
DECISIONS	**CUES**	**ERRORS**
Whether to use wet or dry sanding or power sander	Size of repair	Not using power sander on large areas

A3

B5 (TASK STATEMENT) FEATHEREDGE BROKEN SURFACES

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Fluids under pressure (Examples: incompressibility, transfer of pressure) [compressed air] Centrifugal forces developed by bodies in rotation (Examples: force tending to discharge material from a rotating body) [operating power sanders] Effects of friction on work processes and product quality [friction while sanding] Behavioral Science (see index)	Use of numbers (without calculation) . [grit and dimension] Coding

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Questioning shop manager or peers	Terminology/general vocabulary, clarity of expression
Reading	Shop manuals, school notes, label directions	Comprehension, detail/inference, information reports, recommeddation reports, description of mechanism, definition, terminology
Touching	Smoothness, levelness, correct contour	Size, shape, depth, texture
Seeing	Smoothness, levelness, correct contour	Size, shape, depth, texture

B_6 (TASK STATEMENT) MIX AND REDUCE REFINISHING MATERIALS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Container of material Clean proper can or container Paint paddle Thinner or reducer Paint strainer Spray gun cup	Open container or shake on paintshaker Mix contents if needed Pour correct amount of material in a properly cleaned container Thin or reduce in accordance with label directions Stir with a paint paddle **Strain if necessary with a paint strainer into the spray gun cup** Choose reducers and thinner according to temperature and humidity	Eye protection - eye injury Inflammable material - fire

DECISIONS	CUES	ERRORS
What reducer or thinner to use	Temperature	Peels or runs

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(TASK STATEMENT) MIX AND REDUCE REFINISHING MATERIALS

SCIENCE	MATH – NUMBER SYSTEMS
Behavioral index (see index)	Measurement: non-geometric liquid Ratio and proportion estimate ratios paint and material Addition and subtraction of whole numbers[homoginizing-refinishing material, temperature/humidity]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Label directions	Information reports, recommendation reports, description of mechanism
Seeing	To mix correctly	Describing, detail/inference, color discrimination
Speaking	Shop foreman	Terminology, general vocabulary

B7 (TASK STATEMENT) TREAT BARE METAL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Clean cloths Chemical cleaners	Remove rust **Featheredge** Use clean rag Thoroughly wet rag with chemical metal conditioner (note: different type conditioners for different type metals), follow label directions Wipe dry while still wet	Eye protection - eye injury Rubber gloves - chemical burn Ventilation - breathing vapors Proper storage containers - fire

DECISIONS	CUES	ERRORS
Determine type of chemical use	**Metal used**	Loss of adhesion between metal and primer

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B_7 (TASK STATEMENT) TREAT BARE METAL

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Chemical reaction between metal conditioner and metal Behavioral Science (see index)	Ratio and proportion [metal conditioner] **(estimation)**

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Follow directions on container	Informational reports, recommendation reports, description of mechanism

B8 (TASK STATEMENT) MASK OPERATIONS

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Masking tape (various sizes) Masking paper (various sizes) Masking machine Clean cloths Steel wool	Clean the objects to be masked Select proper size tapes or/and papers Be careful tape does not overlap on painted surface Position tape and press firmly in place Position tape with paper attached and press into place Immediately remove masking after lacquer top coats After enamel top coats, remove next day	Paper can cause cuts

DECISIONS	CUES	ERRORS
Determine what sizes of tape and/or paper to use	Size of moulding glass - panel- etc.	Waste of material Overlap on painted surfaces Poor appearances

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B8 (TASK STATEMENT) MASK OPERATIONS

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Effects of friction on work precesses and product quality [friction - steel wool cleans with a friction action] Behavioral Science (see index)	Measurement: geometric [take tape and paper size fractions] linear

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Printed manuals	Comprehension, detail/inference, informational report recommendation report, description of mechanism,
Seeing	Watching the operations being done	Visual analysis, logic, detail/inference, color discrimination

B_9 (TASK STATEMENT) APPLY PRIMER SURFACER AND GLAZING PUTTY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Primer surfacer properly reduced Spray gun and air hose Glazing putty	Surface must be clean Bear metal should be metal conditioned Apply 3 or 4 medium wet coats allowing each single coat to flash off, before proceeding with the next coat Apply glazing putty to small imperfections if needed	Eye protection - eye injury Inflammable material - fires Safety standard rules for compressed air

DECISIONS	CUES	ERRORS
Whether to use glazing putty	Pits or imperfections present	Lost time

(TASK STATEMENT) APPLY PRIMER SURFACER AND GLAZING PUTTY

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Fluids under pressure (Examples: incompressibility, transfer of pressure) [air under pressure] Behavioral Science (see index)	Ratio-paint and material ratio and proportion estimates

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Label directions Refinished manuals	Informational report, recommendation reports, description of mechanism
Speaking	Peers Shop foreman	Terminology, general vocabulary

B10 (TASK STATEMENT) SAND OLD FINISH, PRIMER SURFACER, AND GLAZING PUTTY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Bucket & sponge Sandpaper Sanding block or squeegee Spray gun Primer surfacer Lacquer thinner	Select proper grit sandpaper Sand until the finish has a uniform dull appearance Clean surface with water and sponge or airhose and rag Reprime any bare spots or places needing more blocking	Eye protection - eye injury Safety standard rules for compressed air

DECISIONS	CUES	ERRORS
Type of sandpaper Whether to use a sanding block or squeegee	Type of finish to apply Size of repair area If area has been featheredged	Scratches Surface not true

B10 (TASK STATEMENT) SAND OLD FINISH, PRIMER SURFACER, AND GLAZING PUTTY

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Fluids under pressure (Examples: incompressibility, transfer of pressure) [compressed air] Effects of friction on work processes and product quality [friction - sandpaper] Behavioral Science (see index)	Use of numbers (without calculation) [grit and dimension] Coding Ratios and proportion estimate [ratios - paint and material] Measurement: non-geometric liquid

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Questioning shop manager	Terminology/general vocabulary, clairty of expression, logic
Touching	Smoothness, levelness	Texture
Seeing	Smoothness, levelness	

11 (TASK STATEMENT) **PREPARE FOR ALKYD ENAMEL REFINISHING**

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Bucket and sponge Car soap Toweling Waxing remover chemical Rags Sandpaper and sanding disks Metal conditioner Masking tape and paper Primer surfacer Glazing putty Lacquer thinner and enamel reducer Spray booth Sealer Enamel Spray guns Air hose Blow gun and tack rag Power sander	Wash and dewax surface **Featheredge broken areas** Treat bare metal with a metal conditioner Mask areas Prime bare surfaces Apply glazing putty Sand entire vehicle Remove sanding sludge with water Wash surface with chemical cleaner Blow and tack vehicle Apply sealer **Blown and tacked again** Apply enamel, reduced in accordance with label directions Unmask and clean up	Eye protection - eye injury Observe standard safety rules for all power equipment and compressed air Thinner and reducers are inflammable - fire Spray booth - fire, dirt in finish Spray respirator - breathing vapors

DECISIONS	CUES	ERRORS
Type of thinner Amount of material Type of sealer Type of enamel reducer	Weather temperature Size of automobile Color of automobile Weather temperature	Sand strach sweeling Insufficient material Poor coverage **Orange peel or runs and sags in paint job**

3.11 (TASK STATEMENT) PREPARE FOR ALKYD ENAMEL REFINISHING

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Fluids under pressure (Examples: incompressibility, transfer of pressure) [atomization and compressed air] Centrifugal forces developed by bodies in rotation (Example: force tending to discharge material from a rotating body) [operating power sanders] Effects of friction on work processes and product quality [friction when sanding, temperature] Behavioral Science (see index)	Measurement: non-geometric liquid Ratio and proportion estimation [reduce metal conditioner and ratios on paint and materials]

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COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Label directions Shop manuals	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Speaking	Shop foreman Peer group	Terminology/general vocabulary, clarity of expression, logic

B_{12}(TASK STATEMENT) REFINISH WITH ACRYLIC ENAMEL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Bucket, sponge, car soap Wax remover chemical Toweling and rags Masking tape and paper Metal conditioner Primer surfacer Sandpaper and disks Blow gun and tack rag Glazing putty Lacquer thinner and enamel reducer Sealer Spray guns Acrylic enamel Spray booth Power sander Air hose	Wash and dewax car Featheredge broken areas Treat bare metal with metal conditioner Mask all surfaces not to be painted Prime all featheredged areas Apply glaze putty Sand entire automobile Remove sanding sludge with water Wash sanded surface with chemical Blow and tack Apply sealer Blow and tack again Apply acrylic enamel reduced in accordance with label directions Unmask and clean up	Eye protection - eye injury Observe standard safety rules for all power equipment and compressed air Spray booth - fire, dirt in finish Spray respirator - breathing vapors Thinners and reducers are inflammable - fire

DECISIONS	CUES	ERRORS
Type of thinner and reducer Type of sealer Amount of material	Weather temperature Color of automobile Size of automobile	Orange peel or runs and sags Poor coverage Insufficient material

B_{12} (TASK STATEMENT) REFINISH WITH ACRYLIC ENAMEL

SCIENCE	MATH – NUMBER SYSTEMS
Fluids under pressure [atomization and compressed air] Centrifugal forces developed by bodies in rotation [operating power sanders] Effects of friction on work processes and product quality [friction while sanding] [humidity/temperature] Behavioral Science (see index)	Ratio and proportion, estimate [ratios - paint and materials] Ratio and proportion, estimate [reduce metal conditioner] Use of numbers (without calculations) [grit and dimensions]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Label directions Shop manuals	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanisms, definition, terminology
Speaking	Shop foreman Peer group	Terminology/general vocabulary, clarity of expression, logic
Feeling	Level areas	Shape, depth, consistency, texture

B_{13} (TASK STATEMENT) PREPARE FOR POLYURETHANE ENAMEL FINISHES

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Chemical dewaxers Chemical metal conditioners Clean cloths Power sanders Standard spray booth Spray gun and hoses Sanding block Polyurethane materials Blow gun Tack rags Sandpapers Paint strainers Bucket and sponge Glazing putty Masking materials Primer - sealers	Clean and dewax surface Featheredge broken areas Chemically treat bare metal Mask vehicle Apply primer - surfacer Apply glazing putty Sand entire vehicle Blow down and tack wipe Activate polyurethane Apply recommended coats Allow to dry Remove masking Clean up for delivery	Eye protection - eye injury Spray respirator - breathing vapors Container for rags - fire Standard safety rules Compressed air

DECISIONS	CUES	ERRORS
Determine the feasibility of using this material	Condition of existing surface High cost of material	Excessive amount of material Failure of top coats

B13 (TASK STATEMENT) PREPARE FOR POLYURETHANE ENAMEL FINISHES

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Fluids under pressure (Examples: imcompressibility, transfer of pressure) [atomization and compressed air] Centrifugal forces developed by bodies in rotation (Example: force tending to discharge material from a rotating body) [mechanical sanders] Effects of friction on work processes and product quality [friction - sandpapers, sanding block, etc.] Behavioral Science (see index)	Measurement: non-geometric Liquid Ratio and proportion, estimation [metal conditioner paints] Use of numbers (without calculation) [grit and dimension sandpaper] Coding Measurement: geometric [tape and paper size fraction] Linear

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking Reading	Shop foreman Peers Shop manuals School notes Manufacturer directions	Terminology/general vocabulary clarity of expression, logic Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology

B14 (TASK STATEMENT) **PREPARE** FOR ACRYLIC LACQUER REFINISHING

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Chemical dewaxers Chemical metal conditioners Clean cloths Sanding block Mechanical sanders and hoses Primers Sealers Lacquers Tack rag and blow gun Masking machine and materials Sandpapers Polishing compounds Spray guns Paint stainers and paddles Standard spray booth Glazing putty Thinners Power polisher	Wash and dewax vehicle Featheredge broken areas Clean bare metal (conditioners) Mask vehicle Primer all bare metal Apply glazing putty Sand the vehicle Clean up sanding sludge Blow and tack rag surface Apply sealer Retack vehicle Apply lacquer Polish after proper drying Clean up vehicle	Eye protection - eye injury Proper container for rag - fire Spray respirator - breathing vapors Exhaust fan - breathing vapors Observe standard rules

DECISIONS	CUES	ERRORS
Determine grade of thinner to use	Temperature in shop Humidity in shop	Poor adhesion Poor flow out **Excessive orange peel** **Waste of material**

314 (TASK STATEMENT) PREPARE FOR ACRYLIC LACQUER REFINISHING

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Fluids under pressure (Examples: incompressibility, transfer of pressure) [atomization] Centrifugal forces developed by bodies in rotation (Example: force tending to discharge material from a rotating body) [mechanical sander and polisher] Effects of friction on work processes and product quality [sanding, polishing, etc.] [temperature/humidity] Behavioral Science (see index)	Measurement: non-geometric [primer and lacquers sealers] liquid Ratio and proportion, estimation [metal conditioner] Use of numbers (without calculation) [grit and size sandpapers fractions] Coding Measurement: non-geometric [pressures] Pressure

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Shop foreman Fellow workers	Terminology/general vocabulary, clarity of expression, logic
Reading	Manuals Label directions	Comprehension, detail/inference, information reports, recommendation reports description of mechanism, definition, terminology
Feeling	Smoothness of repaired and sanded finishes	Texture

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B15 (TASK STATEMENT) **SPOT REFINISHING AND TOUCH UP**

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard spray booth Spray gun and hoses Polishing compound Tack rag Sandpaper Paint strainers Paint Thinners Clean cloths	Standard preparation Polish adjacent areas Mask adjacent areas Mix paint as to label directions Tack rag surface Mix material Strain into spray gun Select preferred air pressure Spray coat, covering primer spot Apply succeeding coat, overlapping each Apply blending coat Remove masking Polish when dry	Eye protection - eye injury Spray respirator - breathing vapors Safety storage cans - fire Proper ventilation - breathing vapor Standard safety rules

DECISIONS	CUES	ERRORS
Determine whether to spot refinish or do a panel repair Select pressure	Size of the repair/difficult color to match **Type of original material**	Spot repair shows paint mismatch with panel repair Poor paint finish

(TASK STATEMENT) SPOT REFINISH AND TOUCH UP

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Homoginizing-mixing paint Fluids under pressure (Examples: incompressibility, transfer of pressure) [atomization and high pressure air] Effects of friction on work processes and product quality [rubbing compound creates friction-sandpapers] [chemical solubility of lacquer thinner and existing surface] Behavioral Science (see index)	Use of numbers (without calculation) [grit and dimension-sandpaper] Coding Ratio and proportion, estimation [ratio-paint] Measurement: non-geometric [liquid measure, painted-primer] Liquid

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Paint manuals	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Feeling	High and low spots	Size, shape, depth
Seeing	Improperly blended spot repair	Visual analysis, detail/inference, color discrimination
Speaking	Foreman Peer group	Terminology, general vocabulary

B16 **(TASK STATEMENT)** POLISH (RUBBING) LACQUER FINISHES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Power polish Polishing pads Sandpaper Bucket and sponge Polishing compounds Clean cloths	Water sand, very fine sandpaper if dirty or runs, sags, orange peel are present Apply polishing compound to surface Select power polisher or hand method Clean up residue	Grounded electrical connections -shock Eye protection -eye injury Loose clothing - caught in moving parts of sander
DECISIONS	**CUES**	**ERRORS**
Determine grade of polishing compound to use Determine whether or not surface is ready for polishing	Condition of refinished surface Time surface has dried Temperature of drying area	Burn the finish Excessive labor involved Poor surface appearance

B16 **(TASK STATEMENT)** POLISH (RUBBING) LACQUER FINISHES

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Centrifugal forces developed by bodies in rotation (Example: force tending to discharge material from a rotating body) [using a rotating power polisher] Behavioral Science (see index)	Using numbers (without calculation) [grit and dimension] Coding

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Instruction manuals	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Speaking	Shop foreman Peer group	Terminology/general vocabulary, clarity of expression, logic
Seeing	Appearance of finish	Texture, color discrimination
Feeling	Smoothness of finish	Texture, consistency

B17 (TASK STATEMENT) APPLY STRIPING AND DECALS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Wax removing chemical Masking tape and paper Bucket, and squeegee Soap and water Tape measure	Clean the surface Lay out for strips or decals Secure helper if needed Mask as needed for spraying Apply stripe or decals Unmask and clean up	Eye protection - eye injury Inflammable material - fire Safety standard rules for compressed air

DECISIONS	CUES	ERRORS
Determine if helper is needed	Size of decals Contour of panel Type of decal	Destroying decals Poor workmanship

B17 (TASK STATEMENT) APPLY STRIPING AND DECALS

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Fluids under pressure (Examples: incompressibility, transfer of pressure) [air under pressure] Behavioral Science (see index)	Measurement: geometric [tape and paper size fractions] linear Use of numbers (without calculations) [linear measurement fractions] Coding

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COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Directions	Informational reports, recommendation reports, description of mechanism
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic
Seeing	Visual placement appearance	

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B_{18} (TASK STATEMENT) CLEAN UP AND PREPARE FOR DELIVERY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Engine cleaner Interior cleaner Bucket and sponge Water hose Car washing soap White slide wall cleaner Polish and or steel wool Glass cleaner Airhose if needed Touch up brush and matching paint if needed	Clean engine compartment Clean truck compartment Clean interior Clean door jams Wash exterior completely Clean tires Polish or steel wool bumper Touch up if needed Clean glass Safety check if necessary	Eye protection - eye injury Safety standard rules for compressed air if needed Do not use flammable engine cleaner

DECISIONS	CUES	ERRORS
N/A	N/A	N/A

18 (TASK STATEMENT) CLEAN UP AND PREPARE FOR DELIVERY

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Fluids under pressure (Examples: incompressiblity, transfer of pressure) [compressed air] Effects of friction on work processes and product quality [washing and cleaning] **Behavioral Science (see index)**	Ratio and proportion, estimation

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Label direcitons	Informational reports, recommendation reports, description of mechanism
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic
Listening	To directions	Auditory discrimination, discriminate facts from non-facts, recognize opinions, logic
Seeing	Checking appearance	Visual analysis, memory, describing, detail/inference, color discrimination

Duty C Repairing and Patching Damages

1 Determine direction of force or impact
2 Determine hidden damage
3 Rough out damaged panel
4 Use of plastic type fillers
5 Use of body lead fillers
6 Set up oxy-acetylene welding equipment
7 Methods-forming sheet metal patches
8 Install sheet metal patches
9 Shrink metal

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C_1 (TASK STATEMENT) DETERMINE DIRECTION OF FORCE OR IMPACT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Trouble lamp	Visual inspection Check for shifted panels Determine direct damage - it occurs first Determine indirect damage - it occurs second	Sharp metal - cuts

DECISIONS	CUES	ERRORS
Determine what damage should be repaired first	The main point of impact	Loss of labor hours Unsatisfactory finished repair Customer complaints

C_1 **(TASK STATEMENT)** DETERMINE DIRECTION OF FORCE OR IMPACT

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Relation of force to distortion in an elastic body [indirect damage] Behavioral Science (see index)	Use of numbers (without calculation) Recording Fractions [tape measure] Measurement: geometric linear

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	Misaligned panels Buckles in metal	Visual analysis, memory, describing, logic, detail/inference, color discrimination
Speaking	Peers Shop foreman	Terminology, general vocabulary

C_2 **(TASK STATEMENT)** DETERMINE HIDDEN DAMAGE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Tape measure Frame manual Automobile lift	Determine type of construction Inspect alignment of adjacent panel Tape measure openings Inspect electrical components Inspect front suspension Inspect steering Visual sightings	Broken glass - cuts Jagged and torn metal - cuts

DECISIONS	CUES	ERRORS
Determine what damages are not apparent	Misalignment Components not operable	Customer dissatisfied Cost of job exceeds estimate Profit loss on job

C2 (TASK STATEMENT) DETERMINE HIDDEN DAMAGE

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Relationship of force to distortion in an elastic body [hidden damage] Behavioral Science (see index)	Linear measurement [tape measure] Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Feeling Seeing Reading	High and low stops Misalignments Body manuals Tape measure	**Size, shape, depth** Visual analysis, memory, describing, logic, detail/inference, color discrimination Comprehension, detail/inference, informational reports, recommendation reports, descripiton of mechanism, definition, terminology

23 (TASK STATEMENT) ROUGH OUT DAMAGED PANEL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit	Analyze type of construction Analyze type of damage Remove parts necessary to expediate repair Remove any sound deadener or undercoatings Unlock metal in damaged area Re-shape gradually to original contour Start at outer edge and work to center of area Level work to a point of filling	Eye protection - eye injury Grounded electrical equipment - shocks Hand to metal contact - cuts

DECISIONS	CUES	ERRORS
Determine method of repair Determine what parts to remove	Type of panel construction Parts that hinder the repair	Excessive labor Excessively stretched metal

C_3 (TASK STATEMENT) ROUGH OUT DAMAGED PANEL

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Relationship of force to distortion in an elastic body [determining the amount of force to apply] Resistance of materials to change in shape (Examples: bending, twisting, stretching, unlocking metal) Behavioral Science (see index)	Use of numbers (without calculations) [wrenches] Coding Deduction Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Feeling Seeing	Checking for high and low spots Visually checking for proper contour Comparing repair to a undamaged panel	Size, shape, depth Visual analysis, memory, describing, logic, detail/inference, color discrimination
Speaking	Foreman Peer group	Terminology, general vocabulary

(TASK STATEMENT) USE PLASTIC TYPE FILLERS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Plastic fill and catalyst Spreaders	Clean area (bare metal) Catalyse and mix plastic filler Apply material into area to be repaired Select leveling methods when plastic is workable	Eye protection - eye injury Dust mask - breathing dust Ventilation - breathing dust

DECISIONS	CUES	ERRORS
Amount of catalyst to use Thickness of build up	Amount of filler being used Temperature of shop	Excessive tackiness Pinholes and blisters Poor color holdout Poor adhesion

C_4 (TASK STATEMENT) USE PLASTIC TYPE FILLERS

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Indestructibility of energy and matter [chemical polymerization - catalyst hardening] Temperature Behavioral Science (see index)	Measurement - mixing of plastic filler [Example: golf ball size of filler, 3'' of catalyst]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Label directions	Information reports, recommendation reports, description of mechanism
Feeling	Finding high and low areas	Size, shape, depth
Speaking	Peers Shop foreman	Terminology, general vocabulary

C5 (TASK STATEMENT) USE BODY LEAD FILLER

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Oxy-acetylene Soder paddles Clean cloth Tinning flux Tinning acids Lead sticks	Clean the area Tin the area Heat solder to plastic state, apply to heated tinned area Paddle plastic lead filler to desire contour Apply a metal conditioner to remove flux and oils Apply leveling tool to obtain desired shape	Fumes, tinning acid - breathing vapors Eye protection - eye injury Hot metal - burns Hot acid - chemical burns

DECISIONS	CUES	ERRORS
Determine whether to use a lead filler or a plastic type body filler	Is the area subjected to high torque and twisting action	Higher cost of repairs Failure of the repaired area

C5 (TASK STATEMENT) USE BODY LEAD FILLER

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Effect of heating and cooling on state of matter (Change of matter from one form to another) [solid lead changed into a plastic state through heat than back into a solid by cooling] Effect of heating and cooling on expansion of materials (change of dimensions) [excessive heat causes metal to buckle and warp] Fluids under pressure (Examples: incompressibility, transfer of pressure) [oxygen and acetylene under pressure] Tinning acids create adhesion between metal and lead filler Behavioral Science (see index)	N/A

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Auto body repair manual	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Speaking	Informed person shop foreman	Terminology/general vocabulary, clarity of expression, logic
Feeling	Find high and low areas	Size, shape, depth

C6 (TASK STATEMENT) SET UP OXY-ACETYLENE WELDING EQUIPMENT

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Oxygen cylinder Acetylene cylinder Welding cart Oxygen gauge Acetylene gauge Hoses Welding torch	Secure oxygen and acetylene cylinders in upright position Remove safety caps Blow out valves (cracking) Attach gauges Attach hoses Attach welding torch	Chain to solid support - falling cylinder Safety caps when tanks are not in use - leakage Store cylinders in vertical position Do not use oil or grease on fittings - fire Eye protection - eye injury Do not store cylinders near excessive heat-explosion

DECISIONS	CUES	ERRORS
Standard procedures	Standard procedures	Standard procedures

C_6 **(TASK STATEMENT)** SET UP OXY-ACETYLENE WELDING EQUIPMENT

SCIENCE	MATH – NUMBER SYSTEMS
• PHYSICAL SCIENCE Simple machines used to gain mechanical advantage (Example: levers, gears, pulleys) [standard tool kit] Fluids under pressure (Examples: incompressibility, transfer of pressure) [gases under pressure] Behavioral Science (see index)	N/A

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Welding manuals	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Speaking	Foreman Peer group	Terminology/general vocabulary, clarity of expression, logic
Seeing	Observation	Visual analysis, memory, describing, logic, detail/inference, color discrimination

C7 (TASK STATEMENT) FORM SHEET METAL PATCHES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Sheet metal Standard tool kit Angle iron Iron pipe (various diameters) Electric metal shears Air operated panel cutters	Measure size of patch needed Determine type of patch needed Layout (straight edge) patch and cut out (tape measure) Form angles or roll Pre-fit patch Perform adjustments	Sharp metal - cuts Eye protection - eye injury Grounded electrical cords - shocks High air pressure

DECISIONS	CUES	ERRORS
Determine size Determine type (one piece, two piece)	Size of area to be covered Existing surface to be repaired	Incorrect size Loss of labor Excessive filling operations

C7 (TASK STATEMENT) FORM SHEET METAL PATCHES

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Simple machines used to gain mechanical advantage (Example: levers, gears, pulleys) [standard tool kit] Fluids under pressure (Examples: incompressibility transfer of pressure) [air operated panel cutters] Work hardening metal rearrangement of molecules Behavioral Science (see index)	Linear measurement (fractions, tape measure) Use of numbers (without calculation) [sheet metal code] Coding Fundamental operations (calculations) [subtraction of material] Addition algorithm Subtraction algorithm Multiplication algorithm Division algorithm Order of operations, i.e., use of parentheses in simplifying arithmetic expressions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Autobody text books (work hardening metal)	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Speaking	Shop foreman Peer group	Terminology/general vocabulary clarity of expression, logic
Seeing	Observing similar operations	Visual analysis, memory, describing, logic, detail/inference, color discrimination

(TASK STATEMENT) INSTALL PATCH PANELS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Welding equipment Sheet metal screws Sheet metal Pop rivets Rivet gun Welding rod Brazing rod Electric spot welder Brazing flux Power disk grinder Grinding disks	Pre-fromed patch (if necessary) Remove paint form area to be repaired Determine method of attaching patch (metal screws) pop rivets, weld, braze, (spot weld) Install patch Prepare edges for filling (lead or plastic fill)	Eye protection Hot metal-burns Welding torch-fire, burns Sharp metal-cuts High air pressure-personal injury Grounded electric cords-shocks Brazing fumes-breathing vapors
DECISIONS	**CUES**	**ERRORS**
Mthod of securing patch panels	High torque areas Critical water areas Shape of existing area	Failure of the repair Excessive labor

(TASK STATEMENT) INSTALL PATCH PANELS

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Effect of heating and cooling on expansion of materials (Change of dimensions) [welding and blazing-expansion and contraction of metal] Fluids under pressure [gas pressure, air pressure] Centrifugal forces developed by bodies in rotation [grinders] Transfer of energy from one form to another [welding-gas under pressure changing to heat] Resistance of materials to flow of electrical current [electric panel spotter operates on a resistance principle] Effects of friction on work processes and product quality [friction-power disk grinders] Effect of heating and cooling on state of matter (Change of matter from one form to another) [welding and brazing- solid rod- through heat to a liquid than back to a solid] Composition of matter, including protons, neutrons, atoms, electrons, molecules, elements [brazing flux-dissolves oxides keeps metal clean]	Use of numbers (without calculation) [grit and dimension size fraction] Coding Read and interpret tables, charts and graphs [welding tip size chart] Measurement: non-geometric [spot welder] Temperature

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Instructions of use with various tools	Comprehension, detail inference, recommendation report, informational report, description of mechanism, definition, terminology
Speaking	Shop foreman Peer group	Terminology, general vocabulary, clarity of expression, logic

C9 (TASK STATEMENT) SHRINK METAL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Oxy-acetylene Damp sponge Straight edge if needed Standard tool kit	Analyze damage Determine the center of the highest point Heat high point to (cherry red, dime size) Strike heated high point with flat face of body hammer Hammer and dolly smooth Cool area with damp sponge Check for correct contour	Eye protection - eye injury Standard safety rules for operating oxy-acetylene welder-burns, fire Care should be taken not to touch hot metal or undercoat

DECISIONS	CUES	ERRORS
Whether to shrink How much to shrink	"Oil can" in metal Size of high area	High spot or oil can in repair Low area - over shrinking

(TASK STATEMENT) SHRINK METAL

SCIENCE	MATH – NUMBER SYSTEMS
PHYSICAL SCIENCE Simple machines used to gain mechanical advantage (Examples: levers, gears, pulleys). [standard tool kit] Effect of heating and cooling on expansion of materials (change of dimensions) [shrinking metal] Fluids under pressure (Examples: incompressibility, transfer of pressure) [oxy-acetylene gas compressed] Transfer of energy from one form to another (Example: potential to kinetic) [oxy-acetylene gas changing to heat] Behavioral Science (see index)	Reading and interpret tables, charts and graphs [welding tip size] Deduction (spot to shrink)

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	Smoothness of panel Color of heated spot Size of heated spot	Visual analysis, memory, detail/ inference, color discrimination
Feeling	Smoothness of panel	Size, shape, depth, consistency, texture

Duty D Repairing and Maintaining Cooling Systems

1 Analyze cooling system
2 Replace radiator, shroud and hoses
3 Replace air-conditioner condenser, dryer and lines
4 Replace water pump, fan, and belts

D_1 (TASK STATEMENT) ANALYZE COOLING SYSTEM

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Pressure testing equipment for cooling system Air-condition testing equipment if needed	Visual inspect A.C. condenser Visual inspect A.C. lines and hoses Visual inspect A.C. dryer and evaporator, valve, and lines Physical inspect operation Visual inspect radiator and hoses Visual inspect fan and belts Pressure inspect and leak test components if needed Visual inspect water pump and all pulleys	Eye protection - eye injury Radiator under pressure when hot - burns Air-condition under high pressure Fan and belts in rotation with engine running - personal injury

DECISIONS	CUES	ERRORS
Whether to use test equipment	Dampeners on radiator A.C. not operating cold enough	Loss of coolant in cooling system A.C. failure

D. (TASK STATEMENT) ANALYZE COOLING SYSTEM

SCIENCE	MATH – NUMBER SYSTEMS
Fluids under pressure (Examples: incompressibility, transfer of pressure) [radiator and A.C.] Centrifugal forces developed by bodies in rotation (Example: force tending to discharge material form a rotating body) [fan and belts] Behavioral Science (see index)	Read and interpret tables, charts, and graphs [P.S.I. charts]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Questioning customer or shop foreman	Terminology/general vocabulary, clarity of expression, logic
Seeing	Visual checking	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Reading	Shop manual charts	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, discrimination, terminology

(TASK STATEMENT) REPLACE RADIATOR, SHROUD, AND HOSES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Drain pan Radiator hose pliers if needed Standard tool kit Coolant Radiator, shroud, hoses if needed Pressure test equipment	Drain radiators Disconnect hose to radiator Disconnect automatic transmission oil lines Remove hoses if replacement is necessary Disconnect A.T. lines if so equipped Remove radiator and shroud for repair, record, or replacement Reinstall shroud Reinstall radiator Reinstall hoses Connect A.T. lines Refill system with coolant Inspect visual and pressure system	Eye protection-eye injury Hot water under pressure-burns Radiator core fins sharp-cuts

DECISIONS	CUES	ERRORS
Whether to repair, recore, or replace radiator	Extent of damage	Poor repair or high cost

D2 (TASK STATEMENT) REPAIR RADIATOR, SHROUD, AND HOSES

SCIENCE	MATH – NUMBER SYSTEMS
Fluids under pressure [hot water under pressure] Behavioral Science (see index)	Use of numbers (without calculations) [wrenches] Coding Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Questioning customer or shop foreman	Terminology/general vocabulary, clarity of expression, logic
Reading	Label directions and charts & manuals	Comprehension, detail/inference, rate/speed, informational record, recommendation record, description of mechanism, definition, terminology
Seeing	Proper installation and alignment of parts	Visual analysis, memory, description, logic, detail/inference, recognition of symbols, emblems, codes

D3 (TASK STATEMENT) REPLACE AIR-CONDITIONER CONDENSER DRYER, AND LINES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Condenser Dryer Lines if needed Recharge equipment Refrigerant	Remove parts necessary to expediate repair Discharge system Remove the condenser Remove the dryer and lines and hoses Replace condenser Replace the dryer Reinstall lines and hoses Recharge system	Eye protection - eye injury Air-conditioner components under extremely high pressure Sharp metal edges - cuts

DECISIONS	CUES	ERRORS
What parts to remove to expediate repairs	Hard to reach bolts Parts in the way	Lost time

D_3 (TASK STATEMENT) REPLACE AIR-CONDITIONER, CONDENSER, DRYER, AND LINES

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage (Example: levers, gears, pulleys) [standard tool kit] Effect of heating and cooling on state of matter (changing of matter from one form to another) [refrigerant changing form liquid to a gas and back to a liquid form when cool] Fluids under pressure (Examples: incompressibility, transfer of pressure) [refrigerant under extremely high pressure] Behavioral Science (see index)	Use of numbers (without calculation) [chart - line pressures] Coding

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	Installation	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic
Reading	Shop manual for procedure	Comprehension, detail/inference, informational report, recommendation report, description of mechanism, definition, terminology

D4 (TASK STATEMENT) REPLACE WATERPUMP, FAN, AND BELTS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Drain pan Standard tool kit Gasket cement Water pump Fan, hoses, and belts if needed Coolant if needed Shop manual if needed	Drain cooling system Remove parts necessary to expediate repair Disconnect hoses to water pump Remove fan, and necessary belts Remove water pump Install water pump Reinstall fan and belts Tighten belts Reinstall all removed parts Refill cooling system with coolant Start engine Visual check system	Hot water under pressure - burns Sharp metal edges - cuts Fan and belts in rotation with engine running - personal injury Eye protection - eye injury

DECISIONS	CUES	ERRORS
What parts to remove	Bolts hard to reach	Lost time

D. (TASK STATEMENT) REPLACE WATERPUMP, FAN, AND BELTS

SCIENCE	MATH – NUMBER SYSTEMS
Fluids under pressure (Example: incompressibility, transfer of pressure) [hot water under pressure] Centrifugal forces developed by bodies in rotation (Examples: force tending to discharge material from a rotating body) [fan in rotation with engine running] Behavioral Science (see index)	Use of numbers (without calculation) [wrenchs] Coding Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Shop manual	Comprehension, detail/inference, informational report, recommendation report, description of mechanism, definition, terminology
Seeing	Proper alignment and installation of parts	Visual analysis, memory, describing logic, detail/inference, recognition of symbols, codes, emblems
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic

Duty E Repairing Frame Damage

1 Analyzing extent of damage to frames
2 Operation of the damage dozer and attachments
3 Repair and align frame to manufacturer's specifications
4 Replace frame assembly
5 Replace front frame section
6 Replace frame horn or repair crossmember

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(TASK STATEMENT) ANALYZE EXTENT OF DAMAGE TO FRAMES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Safety stands or frame machine Frame gauge Tram gauge Frame manual Steel tape Trouble light	Inspect the frame visually Place the automobile on safety stands or frame machine Install frame gauges Check each section Tram where needed Measure where needed Write down measurements Determine repair procedure	Placing the car on safety stands -danger of falling Eye protection-eye injury

DECISIONS	CUES	ERRORS
Determine what frame checking equipment is needed Determine what type of damage the frame has Determine repair procedure	Extent of damage Where damage areas are Extent and area of damage	Making wrong diagnosis Loss of time and money

E_1 (TASK STATEMENT) ANALYZE EXTENT OF DAMAGE TO FRAMES

SCIENCE	MATH – NUMBER SYSTEMS
Effects of friction on work processes and product quality [direct or indirect damage to a frame] Resistance of materials to change in shape (Examples: bending, twisting, stretching) [frame, bending, twisting] Behavioral Science (see index)	Linear measurement (tape measure) Fractions Use of numbers (without calculation) Recording

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	Buckels, twisting etc.	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Reading	Frame manual	Comprehension, detail/inference, informational report, recommendation report, description of mechanism, definition, terminology
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic

E_2 (TASK STATEMENT) OPERATE DAMAGE DOZER AND ATTACHMENTS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Damage dozer Standard damage dozer attachments Safety stands Floor jack Standard tool kit	Remove parts to expediate work Place automobile on safety stands Hook up damage dozer Perform necessary pulls Inspect correct measurement and body contours Disconnect damage dozer	Care on safety stand placement and watching movement of car under pressure - auto falling Care taken on hook up's and checking hook up's under pressure - personal injury Eye protection - eye injury Checking all attachments and chains under pressure - personal injury Damage dozer ram and equipment and hook up under extremely high pressure (10 - 12 tons p.s.i.) - personal injury
DECISIONS	**CUES**	**ERRORS**
Whether to use the damage dozer or porta-power or frame machine	Severity or type of damage	Lost time

(TASK STATEMENT) OPERATE DAMAGE DOZER AND ATTACHMENTS

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit and damage dozer] Effects of friction on work processes and product quality [removal of parts bolted on] Fluids under pressure (Example: incompressibility, transfer of pressure) [damage dozer ram under hydraulic pressure] Behavioral Science (see index)	Linear measurement-tape measure Fractions Use of numbers (without calculation) [wrenche Coding

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic,
Seeing	Alignment of frame or body contour	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Reading	Frame manuals Damage dozer instructions	Comprehension, terminology, instructions

(TASK STATEMENT) REPAIR AND ALIGN A FRAME TO MANUFACTURE SPECIFICATIONS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Frame gauge Tram gauge Steel tape Frame manual and charts Standard tool kit Oxy-acetylene welder Damage dozer or frame machine Hook up equipment, chains, clamps, hooks, and etc. Safety stands Floor jack	Inspect frame Determine type or types of frame damage-Sag Mash Sidesway Diamond Twist Place the automobile on frame machine or jack stands Remove necessary parts to expidite repair Perform necessary hook-ups at controlling points Apply pressure to the frame with a damage dozer or frame machine Heat buckeis if necessary Perform necessary pulls Recheck using, measurement, frame, gauges, tram gauge Pull and measure until the frame will meet manufactures specifications	Eye protection Placing and retaining the car on safety stands-falling auto Hook-up tearing loose or chain breaking-personal injury Oxy-acetylene flame-burn, fire

DECISIONS	CUES	ERRORS
Decide on hook-up points Decide on hook-up equipment	Type of damage Severity of damage	Damage to frame with equipment Equipment not holding to frame

E_3 (TASK STATEMENT) REPAIR AND ALIGN A FRAME TO MANUFACTURE SPECIFICATIONS

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantages (Examples: levers, gears, pulleys) [standard tool kit, frame machine and damage dozer] Effect of heating and cooling on expansion of materials (change of dimensions) [heating buckles] Transfer of heat from one body to another [heat transfer from frame to another part] Relationship of force to distortion in an elastic body [determine the amount of pressure to apply] Resistance of materials to change in shape (Examples: Bending, twisting, stretching) [frame bending, twisting, etc.] **Behavioral Science (see index)**	Linear measurement - tape measure Fractions Use of numbers (without calculations) Recording Use of numbers (without calculations) [wrenches] Coding Read and interpret tables, charts and graphs [welding tip size chart]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Frame manuals	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Speaking	To shop foreman	Terminology/general vocabulary, clarity of expression, logic
Writing	Recording measurements	Penmanship, classification, description, terminology/general vocabulary, usage

E_4 (TASK STATEMENT) REPLACE FRAME ASSEMBLY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Body and frame manuals Safety stands Front suspension tools Engine hoist and chair fall Air wrench Alignment rack Frame	Remove bumpers, front sheet metal and cooling system Remove body Remove engine and drive train Remove exhaust system and gas tank Remove wiring and brake lines Remove front suspension and steering parts Reinstall all parts in the reverse a order of removal Inspect electrical system Inspect cooling system Align front suspension Road test	Eye protection - eye injury Safety stand placement - auto falling Engine hoist and chain fall operated with care - personal injury Safety rules on compressed air for air wrench Gasoline inflammable - care taken in removal and storage of gas tank - fire

DECISIONS	CUES	ERRORS
Whether to repair or replace	Total cost	High cost

E_4 (TASK STATEMENT) REPLACE FRAME ASSEMBLY

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit and engine hoist and chain fall] Centrifugal forces developed by bodies in rotation [air wrench in rotation] Fluids under pressure [compressed air] Effects of friction on work processes and product quality [removal of bolt on parts] Behavioral Science (see index)	Linear measurement - tape measure Fractions Use of numbers (without calculations) Recording Coding [wrenches] Measurement: geometric [alignment gauges] Angle Read and interpret graphs, charts, and tables [alignment charts]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Frame and body manuals	Comprehension, detail/inference, speed/rate, informational record, recommendation record, description of mechanism, definition, terminology
Seeing	Removal, replacement, and alignment of parts	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic

E_5 (TASK STATEMENT) REPLACE FRONT FRAME SECTION

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Oxy-Acetylene torch with attachments Frame gauges Tape measure Frame manual Standard tool kit Special front suspension tools and equipment Option - arc welder Safety stands Floor jack Frame section	Remove parts necessary to expediate work Remove all front suspension and steering parts Remove front frame section Replace front frame section Align front frame section Weld in front frame section Reinstall all front suspension and steering parts	Eye protection - eye injury Safety rules in accordance with oxy-acetylene welder - burns, fires Safety with placement of safety stands - auto falling Safety in removal of front coil springs - proper procedure and equipment - personal injury

DECISIONS	CUES	ERRORS
Whether to repair or replace	Total cost Severity of damage	Poor repair

E_5 (TASK STATEMENT) REPLACE FRONT FRAME SECTION

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage (Example: levers, gears, pulleys) [standard tool kit and front suspension tools] Effect of heating and cooling on expansion of materials (Changine of dimensions) [welding in frame section] Effects of friction on work processes and product quality [removing front suspension parts Effects of material to flow of electrical current [removing front suspension parts] Arc welder works with resistance principle Behavioral Science (see index)	Linear measurement - tape measure Fractions Use of numbers (without calculation) [wrenchs] Coding Reading and interpret tables, charts and graphs [welding tip size chart]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Frame manuals	Comprehension, detail/inference, informational reports, recommendational report, description of mechanism, definition, terminology
Speaking	To shop foreman	Terminology/general vocabulary, clarity of expression, logic
Seeing	To replace and align parts	Visual analysis, memory, description, logic, detail/inference, recognition of symbols, codes, emblems

(TASK STATEMENT) REPLACE A FRAME HORN OR REAR CROSSMEMBER

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Tape measure Frame manual Oxy-acetylene welder with attachments Option arc welder Safety stands Floor jack Frame part	Remove parts necessary to expedite work Remove frame horn or rear cross-member Install new frame horn or rear cross-member Weld in frame forn or rear cross-member Replace parts removed for frame repair	Eye protection-eye injury Safety rules in accoradance with oxy-acetylene welder-fire, burns Safety on correct safety stand placement-auto falling
DECISIONS	**CUES**	**ERRORS**
Whether to repair or replace	Total cost	Poor repair Improper alignments

E_6 (TASK STATEMENT) REPLACE A FRAME HORN OR REAR CROSSMEMBER

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage (Example: levers, gears, pulleys) [standard tool kit] Effect of heating and cooling on expansion of materials (Change of dimensions)[welding in frame horn or rear crossmember] Resistance of material to flow of electrical current [are welder works on resistance principle] Behavioral Science (see index)	Linear measurement - tape measure Fractions Use of numbers (without calculations) [wrench] Read and interpret tables, charts and graphs [welding tipe size chart]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Frame manuals	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Speaking	To shop foreman	Terminology/general vocabulary, clarity of expression, logic
Seeing	To replace and align parts	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems

Duty F Removing and Replacing Panels

1 Replace outer quarter panel
2 Replace rear quarter wheel housing
3 Replace rocker panel
4 Replace hood assembly
5 Replace hood hinges
6 Replace grill assembly
7 Replace front fender (welder)
8 Replace front fender (bolted)
9 Replace innerfront fender panel
10 Replace outer door panel
11 Replace radiator support
12 Replace windshield and rear glass with butyl tape system
13 Replace windshield or back glass with rubber channel
14 Replace center piller
15 Replace cowel panels
16 Replace gas tank
17 Replace front seat tracks
18 Replace deck lid and hinges
19 Replace rear upper body panel
20 Replace lower rear body panel
21 Replace exterior trim
22 Replace and overhaul bumper assemblies
23 Replace roof panel
24 Replace door lock
25 Replace door glass with vent assembly
26 Replace door glass without vent glass
27 Replace door and hinges

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F_1 (TASK STATEMENT) REPLACE OUTER QUARTER PANEL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Quarter panel Welding equipment Power drill Drill bits Welding rod Brazing rod and flux Air chisel Lead or plastic fill Glass removing tools Cutting torch	Determine seams where joined to body Remove fill, in seams Remove interior trim Remove attached components Remove rear glass Cut loose all spot welds and remove any fasteners a. air chisel b. cutting torch and remove panel Clean all seams and edges of body openings Position new panel and trim to fit Clamp, metal screw, or pop rivet and align new panel Weld, braze or spot weld new panel Fill and level seams and joints	Eye protection - eye injury Hot metal - burns High air pressure - personal injury Brazing flux fumes - breathing vapors Grounded power cords - shocks Safety toed shoes - personal injury Rotating power tools - cuts Sharp metal edges - cuts Gasoline present - fire

DECISIONS	CUES	ERRORS
Determine - removing rear glass Determine body filler to use and trimming Determine method of securing the panel	Amount of damage in the glass area High stress areas for fill and securing the panel	Glass breakage Excessive labor cost Ruining the panel Panel breaking loose through vibration

F_1 (TASK STATEMENT) REPLACE OUTER QUARTER PANEL

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage (Examples: levers, gears, pulleys) [standard tool kit] Effect of heating and cooling on expansion of materials (Change of dimension) [welding seam-warpage] Effect of heating and cooling on state of matter (Change of matter from one form to another) [lead to a plastic stage] Fluids under pressure (Examples: incompressibility, transfer of pressure) [gases under pressure] Centrifugal forces developed by bodies in rotation (Examples: force tending to discharge material from a rotating body) [power grinder and drill] Transfer of energy from one form to another (Example: potential to kinetic) [gases to heat] Transfer of heat from one body to another [hot metal burning skin] Polymerization - plastic fillers Behavioral Science (see index)	Use of numbers (without calculation) [wrenches, grit and dimensions and nuts and bolts] Coding Fractions Measurement- mixing of plastic fillers Read and interpret tables, charts and graphs [welding tip size chart and cutting tip size chart]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Peer group Foreman	Terminology/general vocabulary, clarity of expression, logic
Reading	Shop manual	Comprehension, detail/inference, speed/rate, informational reports, recommendation reports, description of mechanism, definition, terminology
Seeing	Film strips Operation being performed	Visual analysis, memory, describing, logic, detail/inference, color discrimination, recognition of symbols, codes, emblems

F_2 (TASK STATEMENT) REPLACE REAR QUARTER WHEEL HOUSING

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Inner quarter panel Welding equipment Air chisel Power grinder Welding rod Clamps	Remove outer quarter Determine location of all spot welds Break loose all spot welds Prepare new panel for installation (trim if necessary) Position into place, align and clamp note: alignment important Fasten by welding	Eye protection - eye injury Hot metal - burns Sharp metal edges - cuts High air pressure - personal injury
DECISIONS	**CUES**	**ERRORS**
Determine whether to replace complete panel or partial panel Determine alignment	Extent of damage Does damage extend into floor area	Excessive labor costs Misfitting quarter panel

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F_2 (TASK STATEMENT) REPLACE REAR QUARTER WHEEL HOUSING

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantages (Example: levers, gears, pulleys) [standard tool kit] Fluids under pressure (Examples: incompressibility, transfer of pressure) [gases under pressure] Centrifugal forces developed by bodies in rotation (Example; force tending to discharge material from a rotating body) [power grinder - centrifugal force] Transfer of energy from one form to another (Example: potential to kinetic) [gases changing to heat] Transfer of heat from one body to another [hot metal burning skin] Behavioral Science (see index)	Deduction (Example: aligning and spot welds Subtraction of metal

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COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Shop manuals	Comprehension, detail/inference, speed/rate, informational reports, recommendation reports, description of mechanism, definition, terminolgoy
Seeing	Observing the operation being formed Alignment of parts	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Speaking	Questioning foreman Questioning peer group	Terminology/general vocabulary, clarity of expression, logic

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F_3 (TASK STATEMENT) REPLACE ROCKER PANEL

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Power saw Welding equipment Welding rod Brazing rod and flux Lead or plastic fill Power grinder Air chisel Clamps	Remove rocker panel sill plate Lay back carpeting and protect Determine where to splice in rocker panel Layout with tape measure and remove panel Cut new panel to fit Clamp into position Weld all seams Fill all seams and level After refinishing install all parts removed	Eye protection - eye injury Sharp metal edges - cuts High air pressure - personal injury Grounded power cords - shocks Brazing rod fumes - breathing vapors Rotating power tools - personal injury Hot metal - burns, fire

DECISIONS	CUES	ERRORS
Determine where to cut old panel Determine type of fill to use	Seam between quarter panel and rocker panel High stress area	Excessive labor involved Cost of material Fill material cracking

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F_3 (TASK STATEMENT) REPLACE ROCKER PANEL

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage (Example: levers, gears, pulleys) [standard tool kit] Effect of heating and cooling on state of matter (Change of matter from one form to another) [lead fill] Effect of heating and cooling on expansion of materials (Change of dimensions) [welding seams warpage] Fluids under pressure (Example: incompressibility, transfer of pressure) [gases under pressure] Centrifugal forces developed by bodies in rotation (Example: force tending to discharge material from a rotating body) [power grinder, centrifugal forces] Transfer of energy from one form to another (Example: potential to kinetic) [gases changing to heat] Transfer of heat form one body to another [hot metal burning skin] Polymerization-plastic fill Behavioral Science (see index)	Linear measurement - tape measure Fractions Read and interpret tables, charts and graphs [welding tip size charts] Use of numbers (without calculation) [wrenches] Coding Measurement - mixing of plastic filler

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COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Peer group Foreman	Terminology/general vocabulary, clarity of expression, logic
Seeing	Alignments Lay out of new panel	Visual analysis, memeory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Reading	Shop manuals	Comprehension, detail/inference, speed/rate, informational reports, recommendation reports, description of mechanism, definition, terminology
Feeling	Finding original seams	Texture, shape

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F4 (TASK STATEMENT) REPLACE HOOD ASSEMBLY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Hood Trim Hood latch Fasteners	Inspect method of retention Remove trim and latch Remove hood to hinge retainers Remove hood from vehicle Transfer any fasteners to replacement hood Position replacement hood on hinges Install fasteners and latch Align hood to fit opening Tighten all fasteners note - trim is usually replaced after refinishing	Eye protection - eye injury Sharp metal edges - cuts Weight (hood) - falling hood

DECISIONS	CUES	ERRORS
Determine method of removal Determine repair or replacement	Hinge arrangement Time involved parts availability	Springing or bending of the hinges Excessive cost

F4 (TASK STATEMENT) REPLACE HOOD ASSEMBLY

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage (Example: levers, gears, pulleys) [standard tool kit] Behavioral Science (see index)	Use of numbers (without calculations) [nuts and bolts] Coding [nuts and bolts, wrenches] Deductions Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	Proper alignment Hinge arrangement Fastener arrangement	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Reading	Shop manuals	Comprehension, detail/inference, speed/rate, information reports, recommendation reports, description of mechanism, definition, terminology
Speaking	Peer group Shop foreman	Terminology/general vocabulary, clarity of expression, logic

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F_5 (TASK STATEMENT) REPLACE HOOD HINGES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Hinges Hood Fasteners	Analyze hinge arrangement and retention (shims etc.) Remove of block hood assembly Mark position of original hinge Remove hinge to body fasteners Position new hinge and fasten Attach hood assembly Align hood Inspect all fasteners for tightness	Weight of parts (strain, pinched fingers) Eye protection - eye injury
DECISIONS	**CUES**	**ERRORS**
Determine if hinge is bent Determine if hinge is repairable	Hood alignment and fit Severity of damage to the hinge Availability of parts	Cost of labor to straighten hinge as compared to the cost of new hinge

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F_5 (TASK STATEMENT) REPLACE HOOD HINGES

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage (Example: levers, gears, pulleys) [standard tool kit and levers - hood hinges] Behavioral Science (see index)	Use of numbers (without calculations) [nuts and bolts and wrenches] Coding Deductions Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	Comparisons Alignments	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Reading	Shop manuals Estimate sheets	Comprehension, detail/inference, speed/rate, informational reports, recommendational reports, description of mechanism, definition, terminology
Speaking	Peer group Shop foreman	Terminology/general vocabulary, clarity of expression, logic

F6 (TASK STATEMENT) REPLACE GRILL ASSEMBLY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Grill parts Fasteners	Analyze the methods of retention Analyze and determine components necessary to repair Disconnect any electrical wiring Remove parts necessary to removing grill assembly Remove all fasteners noting locations and sizes Build up replacement grill Install new grill Replace all components Connect electric wires and check for operation Inspect alignments	Eye protection - eye injury Standard safety rules

DECISIONS	CUES	ERRORS
Determine method of removal Determine what to replace Determine to repair	Type of construction Bent, broken or misaligned components Estimate sheet Availability of parts	Excessive labor Excessive parts cost Appearance of finished product

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F. (TASK STATEMENT) REPLACE GRILL ASSEMBLY

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Behavioral Science (see index)	Use of numbers (without calculations) [nuts and bolts, wrenches, etc.] Coding Fractions

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COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	Alignment Location of fasteners	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes and emblems
Speaking	Peer group Foreman	Terminology/general vocabulary, clarity of expression, logic
Reading	Repair manual Parts books	Comprehension, detail/inference, speed/rate, informational reports, recommendation reports, description of mechanism, definition, terminology

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F_7 (TASK STATEMENT) REPLACE FRONT FENDER (WELDED)

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Fender Welding equipment Welding rod Brazing rod and flux Panel spotter Lead or plastic fill Clamps Power grinder Air lines Wire end brush Power drill Drill bits Pop rivets and gun Sheet metal screws Air chisel	Analyze type of construction Determine factory body joints Remove necessary parts Remove factory fill in seams (lead) Cut loose all attaching spot welds and remove fender Prepare seams for installation of new panel Position new panel and align Temporarily fasten new panel sheet metal screws clamps, pop rivets When aligned, weld, braze or spot weld seams Fill and level all seams Install all components	Eye protection - eye injury Hot metal - burns and fires Brazing rod fumes - breathing vapors Rotating power tools - personal injury Grounded power cords - shocks High air pressure - personal injury Sharp metal edges - cuts

DECISIONS	CUES	ERRORS
Determine whether or not to use temporary mounting method	Will there be any alignment problem	Impossible to align fender when welded into place

F_7 (TASK STATEMENT) REPLACE FRONT FENDER (WELDED)

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Effect of heating and cooling on expansion of materials (change of dimensions) [welding seams - warpage] Effect of heating and cooling on state of matter (change of matter from one form to another) [lead to a plastic stage by heat] Polymerization - plastic fillers Transfer of heat from one body to another [hot metal burning skin] Centrifugal forces developed by bodies in rotation [power drills and grinders] Fluids under pressure [gases under pressure] Transfer of energy from one form to another [gases to heat] Behavioral Science (see index)	Deduction Read and interpret tables, charts and graphs [welding tip size chart] Use of numbers (without calculations) [pop rivets, sheet metal screws] Coding Fractions Measurement - mixing plastic fill

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Feeling	Finding seams Finding high and low spots	Shape, depth, consistency, texture, size
Seeing	Proper alignments	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Speaking	Peer group Foreman	Terminology/general vocabulary, clarity of expression, logic
Reading	Shop manuals	Comprehension, detail/inference, speed/rate, informational reports, recommendation reports, description of mechanism, definition, terminology

F_8 (TASK STATEMENT) REPLACE FRONT FENDER (BOLTED)

127

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Fenders Fasteners Trim mouldings Various parts Power drill Drill bits Refinishing materials Sandpaper Tape measure	Determine method of retention Determine procedure to use for removal Remove parts necessary to removing fender Remove all fasteners noting size and location Prepare replacement fender for installation a. drill holes for trim b. install mouldings c. refinish hidden edges Position fender and attach Align fender to adjacent panels Tighten all fasteners Reinstall all components	Fastened metals - pinched finger Sharp metal edges - cuts Eye protection - eye injury Standard safety rules High air pressures - personal injury
DECISIONS	**CUES**	**ERRORS**
Determine removal procedure Determine feasibility of installing trim before reinstallation of fender	Hidden fasteners Clearance to remove fenders Labor involved in replacing trim after reinstallation	Fender will not clear adjacent parts Impossible to reinstall trim Loss of labor Unacceptable product

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F_8 (TASK STATEMENT) REPLACE FRONT FENDER (BOLTED)

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Centrifugal forces developed by bodies in rotation [centrifugal forces - electric drill] Effects of friction on work processes and product quality [friction - sandpaper] Behavioral Science (see index)	Use of numbers (without calculations) [nuts and bolts, wrenches] sandpaper] Coding Fractions Linear measurement Use of tape measure

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	Alignment Size and location of fasteners	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Reading	Shop manuals	Comprehension, detail/inference, speed/rate, informational reports, recommendation reports, description of mechanism, definition, terminology
Speaking	Peer group Foreman	Terminology/general vocabulary, clarity of expression, logic
Feeling	Flush fit alignments	Texture, depth

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F9 (TASK STATEMENT) REPLACE INNER FRONT FENDER PANEL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Inner fender Fasteners Miscellaneous parts	Inspect fastener arrangement Determine other components to be removed Remove fasteners, noting size and location Remove panel **Reinstall in reverse of above procedure**	Eye protection - eye injury Sharp edges on metal - cuts Standard safety rules

DECISIONS	CUES	ERRORS
Determine other components to remove	What material is hindering the removal	Excessive time involved

F_9 (TASK STATEMENT) REPLACE INNER FENDER PANEL

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Behavioral Science (see index)	Use of numbers (without calculation) [nuts and bolts, wrenches] Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	Location and size of fasteners	Visual analysis, memory, describing logic, detail/inference, recognition of symbols, codes, emblems
Feeling	Hidden fasteners	Size, shape, texture
Speaking	Peer group Foreman	Terminology/general vocabulary, clarity of expression, logic
Reading	Shop manual	Comprehension, detail/inference, speed/rate, informational reports, recommendation reports, description of mechanism, definition, terminology

F_{10} (TASK STATEMENT) REPLACE OUTER DOOR PANEL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Outer door panel Power grinder Air chisel Welding equipment Welding rod Brazing rod	Remove interior trim Remove door, if needed Remove exterior trim and handles Remove outer panel Prepare inner panel Align and locate new panel on inner door frame Install flanges onto inner panel Weld, braze weld, or spot weld as necessary Hang door and check for alignment and contour fit	Eye protection - eye injury High and pressure - personal injury Grounded electrical cords - shock Hot metal - burns, fire Use of a chisel - cuts, flying object

DECISIONS	CUES	ERRORS
Determine method used to remove damaged panel Determine whether to replace complete panel	Amount of damage to inner door panel Severity of damage to outer panel	Adding to existing damage to inner panel Cutting the panel to wrong dimensions

F10 (TASK STATEMENT) REPLACE OUTER DOOR PANEL

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Fluids under pressure [high air pressure] Effects of friction on work processes and product quality [friction - use of a power grinder] Transfer of heat from one body to another [hot metal burning skin] Centrifugal forces developed by bodies in rotation [centrifugal forces - use of power grinders] Effect of heating and cooling on state of matter (change of matter from one form to another) [welding and brazing rod] Transfer of heat from one body to another [welding gases to a high heat] Behavioral Science (see index)	Reading and interpret tables, charts and graphs [welding tip size charts] Use of numbers (without calculation) [wrenches] Coding Fractions Measurement: geometric Linear

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COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Shop manuals	Comprehension, detail/inference, speed/rate, informational reports, recommendation reports, description of mechanism, definition, terminology
Seeing	Film strips Observe the operation being prepared	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Speaking	Peer group Shop foreman	Terminology/general vocabulary, clarity of expression, logic

F11 (TASK STATEMENT) REPLACE RADIATOR SUPPORT

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Radiator support	Remove parts, necessary to expediate repair Drain radiator (if needed) Remove radiator (if needed) Disconnect any wiring that goes through the radiator support Remove radiator support Inspect frame horn alignment (correct if needed) Install radiator support (leave lower bolts loose for front sheet metal alignment) Reinstall other parts and wiring Align front sheet metal Tighten all bolts Fill cooling system (check for leaks)	Eye protection - eye injury Radiator under pressure with hot water when engine is hot - burns Sharp edges on metal parts - cuts

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DECISIONS	CUES	ERRORS
What parts to remove	Danger of damaging the radiator unless removed	Damage to the radiator fins

F_{11}(TASK STATEMENT) REPLACE RADIATOR SUPPORT

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Fluids under pressure [radiator under pressure when hot] Effects of friction on work processes and product quality [lossing bolts] Behavioral Science (see index)	Use of numbers (without calculation) [wrench size] Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	Alignment of parts	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic
Feeling	Check temperature of radiator	Temperature

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F12 (TASK STATEMENT) REPLACE WINDSHIELD AND REAR GLASS WITH BUTYL TAPE SYSTEM

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Reveal moulding remover tool Standard tool kit Butyl tape kit Glass primer Glass Masking tape Windshield checking blocks if needed Glass cleaner Paper towel Gloves if needed Suction cups for one-man operation Piano wire or glass removing knife Reveal molding clips if needed	Remove outside reveal moulding (Note windshield only) Remove windshield wipers (Note windshield only) Remove lower cowel panel if needed (Note windshield only) Disconnect antenna wire on some models Remove inside garnish mouldings if necessary Remove glass Blow and clean opening Align new glass in opening and mark position if needed Clean and prime opening with glass primer Clean inside of glass around edge Replace any broken clips Install butyl tape Install glass Reinstall all parts removed Water test for leaks Clean glass	Eye protection - eye injury Standard safety for compressed air Gloves should be worn if the glass has broken - cuts

DECISIONS	CUES	ERRORS
Whether to remove all originial cement caulking Whether to use a helper	Original cement caulking becoming loose Equipment available	Water leaks Broken glass

(TASK STATEMENT) REPLACE WINDSHIELD AND REAR GLASS WITH BUTYL TAPE SYSTEM

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Fluids under pressure [blowing with compressed air] Effects of friction on work processes and prodcut quality [friction caused by cutting cement caulking and butyl tape] Behavioral Science (see index)	Use of numbers (without calculations) [wrench size-butyl tape size] Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Direction on glass kit Shop manual Label directions	Comprehension, detail/inference, speed/rate, informational report, recommendation report, description of mechanism, definition, terminology
Seeing	Alignment and installation of glass	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic

F_{13} (TASK STATEMENT) , REPLACE WINDSHIELD OR BACK GLASS WITH RUBBER CHANNEL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Reveal moulding tool remover some models Rubber rope installing tool some models Glass checking blocks Masking tape String Caulking and caulking gun Reveal clips if needed Rubber channel pull tool ff needed Glass cleaner and paper towing Rags Wax remover	Remove outside reveal mouldings on some models Remove necessary parts to expidite removal of glass Drop headliner near glass on some models Remove rubber rope in center of rubber channel on some models - note: These models leave the rubber channel in the opening Remove glass and rubber channel Align new glass in opening and mark position Remove rubber channel and mouldings if so equipped Install rubber channel and moulding some models on new glass Clean opening and channel to opening flange if needed Replace broker clips if needed	Eye protection - eye injury Standard safety for compressed air Gloves should be worn if the glass has broken Performance knowledg con't Install installing string in channel flange if needed Replace caulking around rubber channel channel flange Install channel and glass assembly Inspect for leaks Install all remaining parts Clean up glass
DECISIONS	**CUES**	**ERRORS**
How reveal mouldings are installed	Type of moulding	Bent moulding

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F_{13}(TASK STATEMENT) REPLACE WINDSHIELD OR BACK GLASS WITH RUBBER CHANNEL

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Fluids under pressure [blowing with compressed air] Effects of friction on work processes and product quality [friction caused by installing glass channel by pulling string over pinchweld] Behavioral Science (see index)	Use of numbers (without calculations) [wrench size] Coding

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Shop manual Label directions	Comprehension, detail/inference, speed/rate, informational reports, recommendation reports, description of mechanism, definition, terminology
Seeing	Alignment and installation of glass	Visual analysis, memory, descirption, logic, recognition of symbols, codes, emblems, detail/inference
Speaking	Questioning shop foreman	Terminology/general votabulary, clarity of expression, logic

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F_{14} (TASK STATEMENT) REPLACE CENTER PILLER

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Tape measure Refinishing materials - paint, sand paper, primer etc. Making **Oxy-acetylene weld and attachments** Welding rod Vice grips, clamps Spray gun and air hose Air drill or grinder Panel cutter (air type)	Remove rear door assembly Remove interior trim and carpet as needed Inspect body opening - measure Remove center piller Position center piller - measure Tack weld in position Hang rear door Inspect alignment of center piller and doors Weld in place **Prepare for paint** Install doors Install interior trim and carpet	Eye protection - eye injury Safety standard for compressed air tools Safety standard for **oxy-acetylene** welding - burns

DECISIONS	CUES	ERRORS
Whether to repair or replace	Amount of damage Cost of repairs compared to replacement	Excess labor

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F_{14}(TASK STATEMENT) REPLACE CENTER PILLER

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Effect of heating and cooling on expansion of materials (change of dimensions) [welding center piller - change of dimensions in alignment] Fluids under pressure [compressed air for air tools] Centrifugal forces developed by bodies in rotation [air drill or grinder in rotation Behavioral Science (see index)	Analyze - deductive or inductive Use of numbers (without calculations) [wrench size] Fractions - tape measure Ratio and proportion - estimate [reduce refinishing material] Measurement: non-geometric [liquid measure - mixing paint] liquid Read and interpret tables, charts and graphs [welding tip size charts etc.]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	Installation of parts Alignment of parts	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Speaking	Questioning shop Foreman	Terminology/general vocabulary, clarity of expression, logic

F_{15} (TASK STATEMENT) REPLACE COWEL PANEL

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Oxy-acetylene welder and attachments Panel cutter air type Tape measure Welding rod Refinish materials, paint, thinner, primer, metal condict, etc. Seam and joint sealer Caulking gun Body grinder on air drill Grinding disks and sandpaper	Remove parts and trim necessary to expedite repair Inspect alignment of cowel - measure Align cowel to correct panel or panels Remove damaged cowel panel Position new cowel panel Tack weld If necessary install door and check alignment and check windshield opening if necessary Weld cowel in place Prepare to refinish Seal for water leak protection Refinish as needed Reinstall door and all parts removed	Standard safety rules for oxy-acetylene welding equipment-burns, fire Eye protection - eye injury Sharp metal edges - cuts Compressed air for air tools and spray gun - personal injury

DECISIONS	CUES	ERRORS
Whether to replace or repair	Amount of damage	Excess labor

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(TASK STATEMENT) REPLACE COWEL PANEL

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Effect of heating and cooling on expansion of materials (change of dimensions) [cowel changing alignment position while welding] Fluids under pressure [air tools and spray gun] Centrifugal forced developed by bidies in rotation [air drill and body grinder in rotation] Mixing refinishing material Behavioral Science (see index)	Use of numbers (without calculations) [wrenches] Coding Measurement: non-geometric [liquid measure, reducing paint, primer, etc.] Read and interpret tables, charts, and/or graphs [welding tip size charts etc.] Measurement-tape measure Fractions

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COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	Alignment and installation of parts	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic
Writing	Recording measurement	Penmanship, classification, description, terminology/general vocabulary, usage
Reading	Shop manuals	Comprehension, description of mechanism, instructions, terminology

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F_{16} (TASK STATEMENT) REPLACE GAS TANK

143

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Container for gasoline (if needed) Fireproof storage Safety stands Floor jack Creeper	Place car on safety stands Disconnect groud wire to tank Drain tank if necessary Disconnect filler tube and vent if necessary Remove tank Store tank and gasoline in fire safe place Replace or reinstall all parts in reverse procedure	Do not remove near any type fire-fire Do not use trouble light - fire Gasoline to skin ocntact will irritate - skin burn Remove clothing that has come in contact with gasoline - fire, skin burn

DECISIONS	CUES	ERRORS
Whether to remove tank	Fire danger	Fire

F16 (TASK STATEMENT) REPLACE GAS TANK

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] **Effects of friction on work processes and product quality** [removal of nuts and bolts] Behavioral Science (see index)	Deduction (amount of gasoline in tank)

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic
Seeing	Removal and replacement	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Reading	Repair manual	Comprehension, description of mechanism, terminology, instructions

F_{17} (TASK STATEMENT) REPLACE FRONT SEAT TRACKS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit	Remove step plates Remove carpet if needed Remove seat belts if needed Remove front seat-note disconnect wiring for electric seat if equipped Remove damaged or worn seat track or tracks Reinstall parts in the reverse procedure of removal	Eye protection - eye injury Sharp edges on seat tracks - cuts

DECISIONS	CUES	ERRORS
Whether to remove carpet	Hard to reach bolts	Torn carpet

(TASK STATEMENT) REPLACE FRONT SEAT TRACKS

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Behavioral Science (see index)	Use of numbers (without calculations) Coding [wrenches] Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	To replace seat tracks	Visual analysis, memory, detail/ inference
Feeling	Hidden bolts	Size, shape, depth, texture
Speaking	Shop foreman Peer groups	Terminology, general vocabulary

F18 (TASK STATEMENT) REPLACE DECK LID AND OR HINGES

147

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Refinishing material, paint, thinner, sealer, primer, metal conditioner Sandpaper Deck lid and or hinges Spray gun Respirator	Remove deck lid to hinge bolts Disconnect hinge torsion rods if hinge is to be replaced Remove hinge pin and hinge assembly Inspect hinge boxes and repair if needed Reinstall hinges and pins Reinstall torsion rods Refinish underside of deck lid and hinges Install deck lid Align deck lid to surrounding panels Refinish Install mouldings, and trim Inspect for dust leaks Inspect for water leaks Inspect for ease of operation	Eye protection - eye injury Standard safety rules for compressed air - personal injury Use care when removing torsion rods - personal injury Use helper for removing and replacing lid - personal injury

DECISIONS	CUES	ERRORS
Whether to replace a hinge Whether or not to run water and dust leak tests	Deck lid out of alignment before replacement Fit with surrounding panels	Weak hinge if repaired Water and dust in rear compartment Customer compaints

F18 (TASK STATEMENT) REPLACE DECK LID AND/OR HINGES

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Effects of friction on work processes and product quality [loosing bolts] Behavioral Science (see index)	Use of numbers (without calculations) [wrenches - fractions] Coding Use of numbers (without calculations) [reducing paint] Ratio Ratio and proportion, estimate [paint ratios] Measurement: non-geometric [measure paint, and primer] Liquid

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	Alignment of deck lid Water stains **Evidence of dirt and dust**	Visual analysis, memory, description, logic, detail/inference, recognition of symbols, codes, emblems
Touching	**Smoothness of surface**	Shape, depth, consistency, texture
Speaking	Shop foreman Peer group	Terminology, general vocabulary

F19 (TASK STATEMENT) REPLACE REAR UPPER BODY PANEL

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Glass moulding tool Rear body panel Panel cutter Oxy-acetylene welder if needed Glass kit Leading paddle if needed Seam and joint sealer Refinishing material, paint, thinner, primer, sandpaper, disks Body grinder and air motor	Remove deck lid to hinge bolts Remove rear glass If factory rear panel joints are leaded, remove fill Remove panel from hinge boxes if needed Remove panel Smooth panels at panel joints Install panel and align Weld in panel Lead, and/or plastic fill joints Sand, smooth joints and panel Prime and prepare for refinishing Paint pinch weld flange Reinstall back window Reseal factory joints if needed Reinstall deck lid and align	Eye protection - eye injury Safety rules for air tools, and body grinder - personal injury Safety rules for oxy-acetylene if needed - fire, burns Beware of molten lead - burns, fire Sharp metal edges - cuts

DECISIONS	CUES	ERRORS
Whether to replace or repair	Replacement as compared to cost of repair	Excessive labor cost

(TASK STATEMENT) REPLACE REAR UPPER BODY PANEL

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Effect of heating and cooling on expansion of material [welding in panel] Fluids under pressure[oxy-acetylene gas under pressure] [compressed air] Centrifugal forces developed by bodies in rotation [body grinder, air motor in rotation] Mixing of paint with thinner Mixing catalyst in plastic filler Transfer of energy from one form to another [oxy-acetylene gas changing to heat] Behavioral Science (see index)	Use of numbers [wrenches] Coding Read and interpret tables, charts, and graphs [welding tip size] Fractions Paint ratios Measurement: non-geometric [paint measure] Liquid

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	Alignment	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Feeling	Smoothness of panel	Texture
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic
REading	Code charts Manufacturer's labels and directions	Comprehension

F20 (TASK STATEMENT) REPLACE LOWER REAR BODY PANEL

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Rear body panel Panel cutter Oxy-acetylene welder Welding or brazing rod 30/70 body lead Leading paddle Body grinder and or air drill and electric drill Acid core solder Seam and joint sealer Caulking gun Refinish material - paint primer, thinner, sealer, metal conditioner Sandpaper and disks	Remove rear bumper Determine joints Remove tailights (some models) Remove trunk interior, trim (some models) and weather strip Pull any floor pan damage Remove panel Smooth smoothing area to panel attachment Install panel Weld panel Lead joints if needed Smooth joints Get ready for refinish metal (conditioner) prime Seal joints as needed Paint edges Install parts in reverse procedure	Eye protection - eye injury Safety rules for air tools - personal injury Safety rules for oxy-acetylene-fire burns Sharp edges - cuts Beware of molten lead - fire, burns Beware of gasoline tank - fire

DECISIONS	CUES	ERRORS
Whether to repair or replace	Can it be repaired	Excessive labor cost

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F_{20} (TASK STATEMENT) REPLACE LOWER REAR BODYPANEL

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Effect of heating and cooling on expansion of materials [welding in panel] Fluids under pressure [oxy-acetylene gas under pressure] [compressed air for spray gun and air tools] Centrifugal forces developed by bodies in rotation [body grinder and air drill, and electric drill in rotation] Transfer of heat from one body to another Resistance of materials to flow of electrical current oxy-acetylene gas changing to heat] Effects of friction on work processes and product quality [removing old panel with panel cutter Mixing of materials (Homoginizing) Behavioral Science (see index)	Use of numbers (without calculations) [wrenches] Coding Measurement: non-geometric [liquid measure - primer, paint] Liquid Read and interpret tables, charts and graphs [welding tip size] Fractions Ratio and proportion, estimates [reduce, metal conditioner, paint, and primer]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	Alignment of panel Smoothness	Visual analysis, memory, describing, logic, detail/inference, recognition of symbols, codes, emblems
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic
Feeling	For smoothness	Shape, depth, consistency, texture

F21 (TASK STATEMENT) REPLACE EXTERIOR TRIM

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Trim mouldings Trim retainers	Determine type of trim retention fasteners Remove all threaded fasteners Pry loose all friction type fasteners Replace all broken retainers Position all threaded retainers Position trim and snap securely into place Replace threaded nuts	Eye protection-eye injury Sharp edges on panels-cuts

DECISIONS	CUES	ERRORS
Determine type of retention	Visible threaded retainers	Bent and twist trim Excessive parts cost

21 (TASK STATEMENT) REPLACE EXTERIOR TRIM

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage (Examples: Levers, gears, pulleys) [Standard tool kit] Behavioral Science (see index)	Use of numbers (without calculation) Coding [nuts and bolts] Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Shop manuals Catalogs	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Speaking	Peer group Shop foreman	Terminology/general vocabulary, clarity of expression, logic
Seeing	Alignment of trim	Visual analysis, memory, describing, logic, detail and inference

F_{22} (TASK STATEMENT) REPLACE AND OVERHAUL BUMPER ASSEMBLIES

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Floor stands Floor hydraulic jack Power wrenches Electric wrenches Oxy-acetylene cutting torch Parts to rebuild	Jack up vehicle Place safety stands under vehicle Disconnect any electric wiring Remove attaching retainers Replace all damaged parts Straighten damaged back supporting bars if called for Reassemble all components Attach complete assembly to vehicle Align bumper to sheet metal parts	Safety car stands-auto falling Eye protection (rust particles, dirt etc.)-eye injury Excessive weight of bumpers-strain Possible use of heat-burns Electric cords-shocks High air pressures-personal injury Gas filled energy absorbing bumpers-danager of explosion if heated Spring loaded energy absorbing bumpers personal injury
DECISIONS	**CUES**	**ERRORS**
Determine, replacement or repairing of back bars or face bars	The estimate sheet Severity of damage Cost of parts **Chrome cannot be repaired**	Additional cost of repairs

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F_{22} (TASK STATEMENT) REPLACE AND OVERHAUL BUMPER ASSEMBLIES

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage (Examples: Levers, gears, pulleys) [standard tool kit] Effect of heating and cooling on expansion of materials (Change of dimensions) [loosen rusted nuts and bolts] Fluids under pressure (Examples: Incompressibility, transfer of pressure)[high air pressures] Transfer of energy from one form to another (Example: potential to kinetic) [gases turned into heat] Relationship of force to distortion in an elastic body [distorted and bent back bars] **Behavioral Science (see index)**	Use of numbers (without calculation) Coding [wrenches] Read and interpret tables, charts and graphs [cutting material charts **Fractions**

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COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Repair manual Parts catalog	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition
Seeing	Relation of various parts, correct adjustments	Visual analysis, (parts in relation to whole), detail and inference

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F_{23} (TASK STATEMENT) REPLACE ROOF PANEL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Headliner tool Panel cutter Body grinder and/or air motor Sanding disks, sandpaper etc. Oxy-acetylene welder with attachments Welding rod Electric spotwelder or mig welder Glass kits Seam and joint sealent Acid core solder and body lead Rags Refinish materials, primer, paint, thinner, metal conditioner, etc. Body file Sanding block Leading paddle Plastic filler and 30/70 body lead	Remove headliner, windshield, & back glass; front & rear seats, carpet Make necessary pulls or push repair to align body openings Remove roof panel, at factory seams, remove and fill at seams; remove any intervails to be replaced Install inter roof rails & outer roof panel (tack weld); insert glass in openings; weld in roof panels Lead all factory leaded joints; smooth & use plastic filler if necessary Smooth correct contour; sand & smooth welds as needed Prime as needed; seal drip rails Paint any flange edges that could be covered Install glass Install headline-and other parts	Eye protection-eye injury Standard safety rules to apply to all all air tools, grinders, etc.-personal injury Sharp metal edges-cuts Use helper for handling top-strain Beware of molten lead-burns, fire

DECISIONS	CUES	ERRORS
How much trim to remove	Danger of damaging	Damage to trim

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F_{24} (TASK STATEMENT) REPLACE DOOR LOCK

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Door handle clip remover White lithium soap grease Trouble light	Remove interior trim Remove outer door handle Disconnect remote control Disconnect inside lock rod and button Disconnect and or remove rear glass run channel Remove screws, securing lock to door frame Slip out lock Grease new lock Install reversing above procedure	Sharp metal - cuts Eye protection eye injury Grounded electrical cords - shocks

DECISIONS	CUES	ERRORS
Determine whether to replace or to lubricate the lock	Lock defective Lock not operating effectively	Excessive cost of the lock

23 (TASK STATEMENT) REPLACE ROOF PANEL

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Effect of heating and cooling on expansion of materials [welding in roof panel change in alignment] Fluids under pressure (Incompressibility, transfer of pressure) [compressed air-air tools, gas under pressure, oxy-acetylene] Centrifugal forces developed by bodies in rotation (Ex.- force tending to discharge material from a rotating body) [body grinder, air motor in rotation] Transfer of energy from one form to another [gases changing to heat] Effects of friction on work processes and product quality [removing panel by cutting with a panel cutter] Effect of heating and cooling on state of matter (Change of matter from one form to another) [leading change from solid to plastic to solid] Behavioral Science (see index)	Use of numbers (without calculation) Coding [sheet metal cutting, fractions, measurement] Basic Logic (deductive or inductive) [analyze replacement procedure, measurement-mixing plaster filler] Read and interpret tables charts and graphs [welding tip sizes] Measurement: non-geometric (liquid) [measure of primer, paint] Ratio and proportion - estimation [reduce primer, paint]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Shop manual	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic
Feeling	Smoothness of joint repair	Consistency, texture
Seeing	Alignment, replacement and smoothness	Visual analysis, memory, describing, logic, detail and inference

F24 (TASK STATEMENT) REPLACE DOOR LOCKS

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage (Ex. - levers, gears, pulleys) [standard tool kit] Effects of friction on work processes and product quality [friction - lubricating the door lock] Polymerization - lithium soap grease - does not	Use of numbers (without calculation) Coding [wrenches] Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Shop manuals	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Seeing	Trying the lock Observing the operation being performed Training film strips	Visual analysis, memory, describing, logic, detail and inference
Speaking	Foreman Peer group	Terminology/general vocabulary, clarity of expression, logic

F_{25} (TASK STATEMENT) REPLACE DOOR GLASS WITH VENT ASSEMBLY

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Trouble light Door handle retainer tool	Remove interior door trim Remove front and rear up stops Remove all screws holding vent assembly in place Remove vent assembly Remove screws holding lower glass channel to regulator arm Rotate glass and remove straight up and out Reinstall in reverse steps of removal and align	Sharp edges on inner door panel - cuts Grounded electric cord - shock
DECISIONS	**CUES**	**ERRORS**
Short cutting the proper procedure	Following a set procedure is usually the easier method	Bent parts Broken glass Loss of time

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F_{25} (TASK STATEMENT) REPLACE DOOR GLASS WITH VENT ASSEMBLY

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage (Ex. - levers, gears, pulleys) [standard tool kit] Behavioral Science (see index)	Use of numbers (without calculation) Coding [wrenches] Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Peer group & foreman	Terminology/general vocabulary, clarity of expression, logic
Reading	Shop manuals	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Seeing	Component arrangement Fastener positions	Visual analysis, detail inference
Feeling	Tension on regulator Correct tension on glass	Movement, tension

26 (TASK STATEMENT) REPLACE DOOR GLASS WITHOUT VENT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Door handle retainer clip tool Trouble light	Remove trim and water deflector Remove front up travel stop Remove rear up travel stop Remove rear glass guide Remove the screws securing the lower sash channel run to the sash channel Disengage sash channel run from window regular arm rollers Push regulator arm aside Lift glass assembly straight up and out In installation the above procedure is reversed Align glass after reinstallation	Sharp edges, inner door panel - cuts Ground electric cord - shock

DECISIONS	CUES	ERRORS
Determine whether or not to by-pass any of the procedure	Most repairs have to be made in an orderly sequence of steps	Excessive time Job more difficult Possible breakage of glass

'26 (TASK STATEMENT) REPLACE DOOR GLASS WITHOUT VENT

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage (Ex. - levers, gears, pulleys) [standard tool kit] Behavioral Science (see index)	Use of numbers (without calculation) Coding [wrenches] Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Manufacturers manual	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Seeing	Study component arrangement Misalignments	Visual analysis, memory, describing, logic, detail and inference
Speaking	Foreman Peer groups Glass manufacturer	Terminology, general vocabulary, logic

F27 (TASK STATEMENT) REPLACE DOOR AND HINGES

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Door Door components (parts) Trouble light White lithium soap grease	Remove interior trim Determine removing hinges at cowl or at door Remove retaining screws at bottom hinge first, top hinge secondly Place door on bench Transfer parts to new door Replace damaged parts Hang door in reverse of above procedures Lubricate moving parts Align door and glass	Doors are heavy, get help - strain Sharp edges on inner door panel - cuts Eye protection - eye injury Grounded electrical cords - shocks
DECISIONS	**CUES**	**ERRORS**
Replace complete door Replace hinges Replace outer door panel	Difference between parts and labor Damage to hinges	Excessive cost of repairs

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F_{27} (TASK STATEMENT) REPLACE DOOR AND HINGES

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage (Ex. - levers, gears, pulleys) [standard tool kit] Polymerization - does not Behavioral Science (see index)	**Use of numbers** (without calculation) Coding [wrenches] Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Shop manuals	Comprehension, detail/inference, informational reports, recommendation, description of mechanism, definition, terminology
Speaking	Peer group Shop foreman	Terminology/general vocabulary, clarity of expression, logic
Seeing	Film strips Observe the operation being performed	Visual analysis, memory, describing, logic, detail and inference

Duty G Repairing Front Suspension and Steering

1 Replace front suspension parts
2 Replace steering parts
3 Replace steering column
4 Align front end

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1 (TASK STATEMENT) REPLACE FRONT SUSPENSION PARTS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Safety stands Floor jack Suspension parts Standard tool kit Alignment rack Grease gun Air wrench	Place the car on safety stands Remove wheel, drum, brake etc. Remove part or parts to be replaced Replace part or parts, wheel Grease new parts if needed Align front suspension	Eye protection - eye injury Safety on safety stand replacement auto falling Removal of coil spring under high pressure - personal injury

DECISIONS	CUES	ERRORS
How many parts to replace	Loose parts or stress marks on rust on parts	Failure to replace worn or damaged part Unsafe auto

1 (TASK STATEMENT) REPLACE FRONT SUSPENSION PARTS

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage (levers, gears, pulleys) [standard tool kit and front suspension tools] Centrifugal forces developed by bodies in rotation [air wrench in rotation] Fluids under pressure (Ex.: incompressibility, transfer of pressure) [compressed air for air wrench] Effects of friction on work processes and product quality [removing of bolts] Behavioral Science (see index)	Use of numbers (without calculation) Coding [wrenches] Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Shop manual	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic
Seeing	To replace and align parts	Visual analysis, memory, describing, logic, detail and inference

(TASK STATEMENT) REPLACE STEERING PARTS

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Safety stands Floorjack Grease gun Alignment rack	Place the car on safety stands Remove parts to expedite repair Remove worn or damaged steering parts Replace steering parts Lubricate parts if needed Reinstall any parts removed to expedite repair Align steering parts	Eye protection-eye injury Safety stand placement-personal injury
DECISIONS	**CUES**	**ERRORS**
What parts to replace	Loose or bent parts	Failure to replace unsafe automobile

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G_2 (TASK STATEMENT) REPLACE STEERING PARTS

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Effects of friction on work processes and product quality [removing bolts] Behavioral Science (see index)	Use of numbers (without calculation) Coding [wrenches] Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Shop manual	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Seeing	Replacement of parts	Visual analysis, memory, describing, logic, detail and inference
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic

G_3 (TASK STATEMENT) REPLACE STEERING COLUMN

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit	Disconnect at the steering box Disconnect under instrument panel Disconnect wiring Remove steering column assembly Rebuild with necessary components Replace in the reverse procedure of removal	Eye protection-eye injury Disconnect battery-fire danger

DECISIONS	CUES	ERRORS
Whether to replace	Broken rivets Compressed upper section	Unsafe vehicle

(TASK STATEMENT) REPLACE STEERING COLUMN

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Behavioral Science (see index)	Use of numbers (without calculation) Coding [wrenches] Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Shop manual	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Seeing	To replace and rebuild	Visual analysis, memory, describing, logic, detail and inference
Speaking	Peer group Shop foreman Factory Repair	Terminology, general vocabulary, logic

(TASK STATEMENT) ALIGN FRONT END

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Wheel aligner Welding equipment for heating purposes Vehicle Air wrench	Inspect front end for visible signs of wear Place vehicle on front end rack Remove hub caps and attach the castor, camber gauges Adjust for castor angle Adjust for camber angle Adjust toe in Adjust steering if necessary Replace hub cap Remove from rack Road test car	Eye protection - eye injury Standard safety rules - personal injury Hot metal - burns, fire High air pressure - personal injury

DECISIONS	CUES	ERRORS
Inspecting for worn parts	Excessive play in steering wheel Worn tires Scuff marks on parts	Impossible to obtain correct alignment

(TASK STATEMENT) ALIGN FRONT END

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Transfer of energy from one form to another [gases into heat] Behavioral Science (see index)	Use of numbers (without calculation) Coding [wrenches, nuts and bolts] Recording Fractions Read and interpret tables, charts and graphs [alignment charts]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Alignment manuals Alignment gauge	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Speaking	Shop foreman Peer group	Terminology/general vocabulary, clarity of expression, logic,
Seeing	Worn parts	Visual analysis, memory, logic, describing, detail and inference
Feeling	Cupped and worn tires Looseness of parts	Consistency, texture

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Duty H Repairing and Replacing Fiberglas Panels

1 Repair fiberglas panel scratches, gouges, and cracks
2 Replace a fiberglas panel
3 Make a fiberglas panel

H_1 (TASK STATEMENT) REPAIR FIBERGLAS PANEL SCRATCHES, GOUGES, AND CRACKS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Epoxy or polyester resin Fiberglass cloth Plastic filler Sanding disks 24 to 80 grit Air drill or electric drill with burr bit Sanding block, squeegee & files or cheese grate plane Orbital or flat reciprocating sander Wax remover Heat gun or lamp Respirator Rags Mixing cup or container Standard tool kit	Determine extent of damage Remove any parts or inner panels to expedite repair Wash and clean repair panel V-groove repair areas Remove flaky edges and featheredge back Clean & sand back of panel on deep gouges and cracks Blow and wipe with cloth, do not use solvent Apply cloth & resin build up to back of panel, apply resin & cloth mixture to face of repair, when cured, sand off Fill imperfections with plastic filler Smooth plastic to correct contour	Eye protection - eye injury Wear respirator - breathing dust Wax remover inflammable - fires Safety standard rules for compressed air - personal injury Danger of mixing epoxy and polyester resins with the wrong catalyst, highly inflammable - fires

DECISIONS	CUES	ERRORS
Whether to use backing reinforcement	Severity of damage	Repair cracking at a later date

1 (TASK STATEMENT) REPAIR FIBERGLAS PANEL SCRATCHES, GOUGES AND CRACKS

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit for removing inter panels] Effect of heating and cooling on state of matter [resins change from a plastic state to a solid state] [Polymerization - a chemical change in resins] Fluids under pressure [compressed air for air tools] Centrifugal forces developed by bodies in rotation [electric drill and sander in rotation] Effects of friction on work processes and product quality [grinding, sanding etc.] **Behavioral Science (see index)**	Measurement - mixing plastic filler Use of numbers (without calculation) Coding [grit and size- sandpaper, wrenches]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	**Label directions**	Informational reports, recommendation reports, description of mechanism
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic
Seeing	Smoothness	Visual analysis, memory, describing, logic, detail and inference
Feeling	Smoothness of contours	Consistency, texture

(TASK STATEMENT) REPLACE A FIBERGLAS PANEL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Resin Fiberglas cloth Plastic filler Standard tool kit Hack saw, or saber saw or key hole metal saw Orbital sander & electric drill Sanding block and squeegee Wax remover Rags Heat gun or lamp Respirator Mixing cups Sanding disks Sandpaper Files, if needed	Analyze the extent of damage Remove the damaged panel Remove all dirt and sand under side of surrounding area 3-4 inches inward from attaching line Clean outer painted surface, remove paint 3-4'' beyond the repair Bevel all outer edges across the entire thickness of the panel Prepare the new panel, remove wax coating with wax remover & sand panel at joining edges, also bevel all outer edges across the entire thickness of panel Blow, clean & repair new panel Position panel & clamp, mix resin & apply 3 layers of cloth & resin mix to outer beveled areas, let cure Sand to correct contour, fill imperfections with plastic filler Smooth to correct contour	Eye protection - eye injury Wear respirator - breathing dust Solvents are inflammable - fire Danger of mixing the wrong catalyst - fire Standard safety rules for compressed air - personal injury

DECISIONS	CUES	ERRORS
How much of new panel to replace	How hard the panel is to remove	Too much time wasted

(TASK STATEMENT) REPLACE A FIBERGLAS PANEL

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Effect of heating and cooling on state of matter (Change of matter from one form to another) [resins change from a plastic state to a solid state] [Polymerization-a chemical change in resins] Fluids under pressure [compressed air for air tools] Centrifugal forces developed by bodies in rotation [electric drill and sander in rotation] Effects of friction on work processes and product quality [grinding, sander etc.] Behavioral Science (see index)	Measurement-mixing filler Resins Linear measurement-reading top measure Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Label directions and shop manual	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic
Seeing	Smoothness and contour	Visual analysis, memory, describing, logic, detail and inference
Feeling	Smoothness of contour	Consistency, texture

(TASK STATEMENT)

MAKE A FIBERGLAS PATCH PANEL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Saber saw Respirator Clamps Masking Separating film Fiberglas mat Resin	Remove the fractured section with a saber saw Re-align panel with clamps is needed Mask of undamaged area Cover repair 3'' beyond damage with separating film Cut matting 2'' larger than fracture Mix resin Apply resin to separating film and matting Lay up matting to separating film and saturate Tape separating film over mat Allow the patch to harden and pop off Apply the patch to under side of repair, using the coventional repair procedure	Eye protection Wear respirator Standard safety rules when operating saber saw

DECISIONS	CUES	ERRORS
Whether to make a patch	Size of hole	More labor

H_3 (TASK STATEMENT) MAKE A FIBERGLAS PATCH PANEL

SCIENCE	MATH – NUMBER SYSTEMS
Effect of heating and cooling on expansion of materials (Change of matter from one form to another) [resins change from a plastic state to a solid state] [Polymerization a chemical change in resins] [Grinding, sawing, etc.] **Behavioral Science (see index)**	Measurement: geometric Linear [tape and paper size - fractions] Ratio and proportion Estimation [ratio - mixing resin] Basic logic Deductive or inductive [analyze size of patch needed]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Label directions	Informational reports, recommendation reports, description of mechanism
Seeing	Correct contour	Visual analysis, memory, describing, logic, detail and inference
Speaking	Shop foreman Peer group	Terminology, logic, clarity of expression

Duty I Maintaining Electrical System

1 Replace, check storage battery
2 Replace electrical units
3 Repair or splice a broken wire
4 Replace wire hardness, engine compartment
5 Replace headlight bulbs and adjust

I. (TASK STATEMENT) REPLACE, CHECK STORAGE BATTERY

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Storage battery Terminal brush Battery carrying strap Hydrometer Test voltmeter	Determine type of hold down Disconnect battery leads Remove battery hold down Attach battery strap and remove battery Wash top of battery with water and baking soda to clean Inspect water level and fill Inspect specific gravity Inspect for cell shorts Clean terminals Clean battery cables Reinstall battery in vehicle Attach battery cables	Eye protection - eye injury Safety toed shoes - personal injury Battery acid - burns Battery acid fumes - breathing/fire

DECISIONS	CUES	ERRORS
Determine to go through check list	Previous trouble, age and mileage on the battery	Complete failure of the electrical system

(TASK STATEMENT) REPLACE, CHECK STORAGE BATTERY

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Transfer of energy from one form to another [transfer energy-battery] [Corrosion of metal] [Charging, cleaning battery] Forces acting on a body immersed or floating in a liquid [use of a hydrometer] Resistance of materials to flow of electrical current [resistance-use of a voltmeter] Behavioral Science (see index)	Use of numbers (without calculations) Coding [wrenches, hydrometer scale] Fractions Read and interpret tables, charts and graphs [voltmeter, reading and interpreting a scale]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Shop manuals	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Speaking	Questioning shop foreman Questioning peer group	Terminology/general vocabulary, clarity of expression
Seeing	Dirty terminals Scale on hydrometer Dials on voltmeter	Logic, detail inference

I_2 (TASK STATEMENT) REPLACE ELECTRICAL UNITS–BASIC STEPS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Circuit tester	Disconnect battery Inspect the connections on each component. Note position and color of of each wire Remove each wire Remove the component Inspect and determine whether to repair or replace Install in reverse procedure Double check connections as a wrong connection may damage unit	Eye protection - eye injury Battery acid - burns Battery acid fumes - breathing Sharp metal edges

DECISIONS	CUES	ERRORS
Determining repair or replacement of part Determine placement of wires	Severity of damage to unit Wiring diagrams	Break down of unit Non-operative units Malfunctioning unit

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I_2 (TASK STATEMENT) REPLACE ELECTRICAL UNITS–BASIC STEPS

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Transfer of energy from one form to another [transfer of energy, battery] Behavioral Science (see index)	Use of numbers (without calculation) Coding [wrenches, wire diagrams and color codes] Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Wiring diagrams, shop manuals, instruction sheets	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Seeing	Coded colored wires	Visual analysis, memory, detail and inference, color discrimination, recognition of symbols, codes, emblems
Speaking	Questioning foreman Questioning peer group	Terminology/general vocabulary, clarity of expression, logic

I_3 (TASK STATEMENT) REPAIR OR SPLICE A BROKEN WIRE

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Soldering iron Solder (resin core) Solderless terminals Crimping tool Automotive wire	Determine which method of repair to use, solder or solderless terminals Peel back insulation Join bare wire ends Heat solder, joint Wrap with insulating tape Bare wire ends Slip correct size solderless terminal over end of each wire Crimp each side tight Check splices	Hot soldering iron - burns, fire Eye protection - eye injury Grounded electrical cords - shocks

DECISIONS	CUES	ERRORS
Determine method of repair	Length of wire to be spliced	Solderless terminals may separate under stress

I_3 (TASK STATEMENT) REPAIR OR SPLICE A BROKEN WIRE

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Effect of heating and cooling on state of matter (Change of matter from one form to another) [change of shape - solder] Composition of matter, including protons, neutrons, electrons, atoms, molecules, elements [resin providing adhesion Behavioral Science (see index)	Use of numbers (without calculation) Coding [wire size charts, solderless terminal chart] Calculation-length of wire Amount of solder to be used

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Questioning foreman Questioning peer group	Terminology/general vocabulary, clarity of expression, logic
Reading	Instruction sheets	Comprehension, detail/inference, informational report, recommendation report, description of mechanism, definition, terminology
Seeing	Matching colored wires	Visual analysis, color discrimination, color coding

(TASK STATEMENT)

REPLACE WIRE HARNESS - ENGINE COMPARTMENT

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY - HAZARD
Standard tool kit Wiring diagram Wiring harness Electrical components	Disconnect battery Determine all connections to electrical components Disconnect all connections Remove all fasteners holding all ground wires Remove all wire retainers and hold downs Work wires through the radiator support and remove as a unit Install harness in reverse of above procedure	Eye protection - eye injury Battery acid - burns Battery fumes - fire Sharp metal edges - cuts

DECISIONS	CUES	ERRORS
Determining to repair or to replace the harness	Severity of damage to the wiring	Time Cost of labor Hidden damage to the harness

L_4 (TASK STATEMENT) REPLACE WIRE HARNESS – ENGINE COMPARTMENT

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Transfer of energy from one form to another [transfer of energy - storage battery] [Corrosion of metal] Behavioral Science (see index)	Use of numbers (without calculation) Coding [wrenches, wire diagram] Fractions

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Questioning foreman Questioning peer group	Terminology/general vocabulary, clarity of expression, logic
Seeing	Various connections	Visual analysis, memory, detail and inference, color discrimination, recognition of symbols, codes, emblems
Reading	Wiring diagrams Shop manuals	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology

I_5 (TASK STATEMENT)

REPLACE HEADLIGHT BULBS AND ADJUST

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Sealed beam units Headlight adjustors	Remove headlamp door or bezel Remove sealed beam retainer ring Disconnect recepticle and remove bulb Install bulb in reverse procedure With headlight door off attach headlight aiming device Set dials and adjust Adjust for desired setting using adjusting screws on head lamp unit Install head lamp door	Sharp metal edges - cuts Possible broken glass - cuts
DECISIONS	**CUES**	**ERRORS**
Determining if necessary to align head lamps	Damaged assembly Use of an adjusting screen	Customer complaint Law violation

5 (TASK STATEMENT) REPLACE HEADLIGHT BULBS AND ADJUST

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Behavioral Science (see index)	Use of numbers (without calculation) Coding [wrenches, reading and scale headlight aimers] **Fractions**

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COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Instruction booklet	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Seeing	Dials on aimer	Visual analysis, memory, detail and inference, color discrimination, recognition of symbols, codes, emblems
Speaking	Questioning a person familiar with the operation	Terminology/general vocabulary, clarity of expression, logic

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Duty J Maintaining Interior Trim

1 Replace headliner
2 Replace seat trim
3 Interior cleaning and stain removal

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1 (TASK STATEMENT) REPLACE HEADLINER

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Headliner tool Standard tool kit Trim adhesive Tacks or staple gun Spray gun with water (cloth type) Heat lamp (vinyl type)	Remove inside garnish moldings Remove sun visor and inside mirror Remove dome lamp Remove headliner starting at front and working to rear Inspect bows for proper position Install headliner starting at the center bow and work to either end Reinstall all parts removed NOTE: Cloth headliner requires sprinkling with water after installation Vinyl headliner may require a heat lamp for installation	Eye protection - eye injury Care should be taken when using the heat lamp - burns Striking finger when tacking Care should be taken when using the staple gun - personal injury

DECISIONS	CUES	ERRORS
What hole to install bows in	Looseness in headliner Bows hitting roof	Wrinkles in headliner Rattles in roof when finished

J_1 (TASK STATEMENT) REPLACE HEADLINER

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Effect of heating and cooling on expansion of materials (change of dimensions) [vinyl top material expanding when heated] Fluids under pressure [spraying cloth headliner with water] Resistance of materials to change in shape [cloth headliner shrinking wher dry after dampened] Behavioral Science (see index)	Ratio and proportion Estimation [reducing dimensions of headliner]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	For installing headliner Smoothness of headliner	Visual analysis, memory, describing, logic, detail and inference
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic
Reading	Shop manual for procedure	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology

J_2 (TASK STATEMENT) REPLACE SEAT TRIM

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Hog ring pliers Hog rings Seat trim	Loosen or remove carpet (if needed) Remove seat & tracks on front Set on bench Remove trim hog rings Remove trim cover Place seat and trim with trim down Replace seat trim with hog rings NOTE: Start at center and work to outside with rings Reinstall seat	Eye protection - eye injury Hog ring may fly when cut
DECISIONS	**CUES**	**ERRORS**
Where hog rings are fastened	Tightness of trim	Lost time or torn trim

(TASK STATEMENT) REPLACE SEAT TRIM

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Behavioral Science (see index)	Use of numbers (without calculation) Coding [wrenches] Fractions Mental calculation in regards to seat trim fit

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Shop manual	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Seeing	Remove and replace trim (smoothness)	Visual analysis, memory, describing, logic, detail and inference
Speaking	Questioning shop foreman	Terminology/general vocabulary, clarity of expression, logic

(TASK STATEMENT) CLEAN INTERIOR AND REMOVE STAINS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Clean cloths Type of cleaner suitable for upholstery to be cleaned Volatile evaporating liquid cleaner Non-volatile evaporating liquid cleaner Detergents Neutral soap Vacuum cleaner or wisk broom	Determine type of materials Cloth type - vacuum or wisk broom Determine type and age of stain Mix solution accordingly to directions Dampen a clean cloth with proper cleaner Rub the stain area lightly working from outer edge to center Complete cleaning, apply only suds to upholstery and scrub with sponge or brush Wipe with clean damp cloth Vinyl types, dry with towel Carpets - vacuum after cleaning	Some cleaners are inflammable - fire Prolong contact with skin may irritate - chemical burns Eye protection - eye injury Danger of electrical shock with electric vacuum cleaner and wet floor

DECISIONS	CUES	ERRORS
What type of cleaner to use	Type of upholstery and stain	Damage to upholstery

(TASK STATEMENT) CLEAN INTERIOR AND REMOVE STAINS

SCIENCE	MATH – NUMBER SYSTEMS
Centrifugal forces developed by bodies in rotation [vacuum cleaner motor in motion to cause vacuum] Effects of friction on work processes and product quality [cleaning of upholstery] [Disolving of dirt with cleaners] Behavioral Science (see index)	Ratio and proportion Estimation [ratios of mixing cleaning fluids] Measurement: non-geometric Liquid [measuring fluids]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Questioning customer & shop foreman	Terminology/general vocabulary, clarity of expression, logic
Reading	Label direction & shop manuals	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Seeing	Removal of stains	Visual analysis, memory, describing, logic, detail and inference, color description

Duty K Adjusting Door, Deck Lids, Hoods, Bumpers, and Door Glass

1 Adjust hoods and front end sheet metal
2 Adjust bumpers
3 Adjust doors
4 Adjust door glass
5 Adjust deck lid and hinges

K1 (TASK STATEMENT) ADJUST HOODS AND FRONT END SHEET METAL

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Portable hydraulic jack Vehicle Hoods and latches Fenders Radiator support Fasteners Hood stops or bumpers	Analyze the alignment problem Determine if hood or sheet metal is source of problem Adjust each hood hinge separately Adjust hood latch Loosen radiator support and shift sheet metal as a unit Shift each fender Readjust hood latch Adjust hood bumpers Inspect for following points Hood to fender fit Hood to cowel panel fit Tightness of hood latch Tighten all fasteners	Sharp metal edges - cuts Eye protection - eye injury Hydraulic jack pressure - personal injury
DECISIONS Determining the misaligned panel	**CUES** Opening and closing the hood and observing Paint chips, paint rubs Visual inspection	**ERRORS** Excessive loss of time

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(TASK STATEMENT) ADJUST HOODS AND FRONT END SHEET METAL

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Fluids under pressure [hydraulic jack] Behavioral Science (see index)	Use of numbers (without calculation) Coding [wrenches, nuts and bolts] Fractions Basic logic [deductive reasoning]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Shop manuals	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanism, definition, terminology
Seeing	Analyzing the problem	Visual analysis, memory, describing, logic, detail and inference
Speaking	Shop foreman Peer group	Terminology/general vocabulary, clarity of expression, logic

K_2 (TASK STATEMENT) ADJUST BUMPERS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Vehicle Bumper face bars Fasteners Back bars	Determine the misalignment Analyze the cause Adjust for lateral alignment by loosening bumper bolts and sliding face bar Tighten bumper bolts Loosen support back bar to frame bolts, to adjust for height, Loosen all back bar retainers to adjust for in and out clearance Secure all retainers	Eye protection - eye injury Safety stands - auto falling Standard safety rules

DECISIONS	CUES	ERRORS
Determining the necessary adjustment	Visual inspection 'in too far,' 'one side lower,' etc. Touching the body	Excessive labor and time

(TASK STATEMENT) ADJUST BUMPERS

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Behavioral Science (see index)	Use of numbers (without calculation) Coding [wrenches, nuts and bolts] **Fractions** Coding [nuts and bolts] **Basic logic [deduction]**

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COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Seeing	Visual examination	Visual analysis, memory, description logic, detail and inference
Speaking	Questioning foreman & peer group	Terminology/general vocabulary, clarity of expression, logic
Reading	Manufacturers specifications	Recommendation reports, description of mechanism

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3 (TASK STATEMENT) ADJUST DOORS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Doors Door hinges Door latches Special wrenches	On sedans start with rear doors Determine type of misalignment Adjust for up and down fit - both hinges loosened Adjust for sag - one hinge at a time Adjust fore and aft - one hinge at a time Adjust door latch for in and out fit Tighten all fasteners	Eye protection - eye injury Standard safety rules

DECISIONS	CUES	ERRORS
Determining the type of adjustment	Scuff marks on sill plate Door dropping when opened Loose fitting, rubbing on the fender Door lock not meeting latch	Excessive time and labor

K (TASK STATEMENT) ADJUST DOORS

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Simple machines used to gain mechanical advantage [special wrenches] **Behavioral Science (see index)**	Use of numbers (without calculation) Coding [wrenches] **Fractions** Basic Logic [deduction]

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COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Reading	Shop manuals	Comprehension, detail/inference, speed/rate, recommendation reports, description of mechanism, definition, terminology
Speaking	Questioning shop foreman, peer group	Terminology/general vocabulary, clarity of expression, logic
Seeing	**Type of problem involved visible signs**	Visual analysis, memory, describing, logic, detail and inference

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K_4 (TASK STATEMENT) ADJUST DOOR GLASS

TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Glass Glass runs Glass stops Glass regulators Fasteners Trouble light	Determine problem Remove interior door trim Adjust in and out fit first Loosen rear vertical glass run Adjust to proper clearance at weather strip Adjust front vertical glass run following same procedure Adjust up and down travel stops Adjust vertical runs to control fore and aft fit Secure all fasteners Replace trim NOTE: Constant check of fit is advised during procedures	Eye protection - eye injury Sharp metal edges - cuts Grounded electrical cords - shocks
DECISIONS	**CUE**	**ERRORS**
Determining the type of adjustment needed Whether or not the glass or door is misaligned	Torn weather strips, wind whistles, water and air leaks, hard operation of the glass	Excessive time and labor cost Broken glass

K$_4$ (TASK STATEMENT) ADJUST DOOR GLASS

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Simple machines used to gain mechanical advantage [glass regulators] Behavioral Science (see index)	Use of numbers (without calculation) Coding [wrenches, nuts and bolts] Fractions Basic logic [deduction]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Shop foreman, peer group	Terminology/general vocabulary, clarity of expression, logic
Reading	Shop manuals	Comprehension, detail/inference, speed/rate, recommendation reports, description of mechanism, definition, terminology
Seeing	Door fit Visible signs	Visual analysis, memory, describing, logic, detail and inference

K_5 (TASK STATEMENT) ADJUST DECK LID AND HINGES

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TOOLS, EQUIPMENT, MATERIALS, OBJECTS ACTED UPON	PERFORMANCE KNOWLEDGE	SAFETY – HAZARD
Standard tool kit Deck or trunk lid Hinges Fasteners	Determine the misalignment Remove deck lid latch plate Loosen retainers at hinges and lid for back and forth adjustment Loosen retainers at hinge to lid for up and down fit Some lids need to have shims added or subtracted to secure up and down adjustment Install latch and adjust for proper operation Inspect all spacings for fit Water leak check is optional	Eye protection - eye injury

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DECISIONS	CUES	ERRORS
The type of adjustment needed	Torn weather stripping Paint rubs Difficult operation of the unit	Possible to bend hinges Water leaks Dust leaks Poor appearance

5 (TASK STATEMENT) ADJUST DECK LID AND HINGES

SCIENCE	MATH – NUMBER SYSTEMS
Simple machines used to gain mechanical advantage [standard tool kit] Behavioral Science (see index)	Use of numbers (without calculation) Coding [wrenches] **Fractions** Basic logic [deduction]

COMMUNICATIONS

PERFORMANCE MODES	EXAMPLES	SKILLS/CONCEPTS
Speaking	Questioning foreman, peer group	Terminology/general vocabulary, clarity of expression, logic
Reading	Shop manuals	Comprehension, detail/inference, informational reports, recommendation reports, description of mechanisms, definition, terminology
Seeing	Visible signs of misalignment	Visual analysis, memory, describing, logic, detail and inference

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Communicate pride in one's work, work area, and personal appearance; consider cleanliness
Have consideration for the opinions of fellow workers
Be aware of the importance of projecting an image of being respectfully conscious of the vehicle being repaired
Be aware of the importance of shop policy which leaves customer relations and complaints to shop foreman
Alleviate feelings of incompetency and frustration by seeking help from co-workers, shop foreman or by consulting an expert in that field
Exercise care of tools and equipment whether they are one's own or the company's

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